Sequencing of the North Corridor Shared Solution

in support of the
Supplemental Environmental Impact Statement

Legacy Parkway
Technical Memorandum

November 2004

Contents

Figures

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1.0 Introduction

The United States Court of Appeals, 10th Circuit (the Court) remanded the Legacy Parkway Final Environmental Impact Statement (EIS) for additional consideration of the following:

1. The Denver & Rio Grande (D&RG) Railroad alignment as an alternative
2. Alternative sequencing of the Shared Solution
3. Integration of the Legacy Parkway and transit
4. Impacts to wildlife
5. Practicability of a narrower right-of-way

This Technical Memorandum presents detailed information to be considered by the U.S. Army Corps of Engineers (USACE), the Federal Highway Administration (FHWA), and the Utah Department of Transportation (UDOT) specific to the Court's ruling regarding alternative sequencing of the three major components of the North Corridor Shared Solution: I-15 improvements, the Legacy Parkway, and a Maximum Reasonable Future Transit as specified in the technical memorandum *Integration of Highways and Transit in the North Corridor*.

The sequencing analysis evaluates the build order of the major components of the Shared Solution to determine the tradeoff between delaying the environmental effects of the Legacy Parkway and minimizing congestion on I-15.

When congestion on I-15 occurs, traffic spills over to the local streets and arterials and increases congestion and travel times on these streets. The increased congestion also increases the potential for crashes on both I-15 and the local arterials. More information about the impacts of I-15 congestion on local arterials and the potential for accidents can be found in Chapter 1 of the Legacy Parkway Final EIS (pages 24 through 26).

Specifically, this technical memorandum focuses on evaluating the alternative timing, or sequencing, of the major components of the Shared Solution. The Shared Solution described in the Final EIS contained other transportation elements such as intelligent transportation systems (ITS), travel demand management (TDM), and arterial improvements. Essentially, all of these elements are included in various ways in the sequencing analysis. Arterial improvements that are a part of the Wasatch Front Regional Council (WFRC) Long-Range Transportation Plan (LRP) are incorporated in the analysis via the travel demand model. Similarly, ITS and TDM are also incorporated into the travel demand model.

This technical memorandum evaluates four sequencing scenarios in terms of their effect on specific environmental and economic impact criteria. Separate technical memoranda have been developed for considering the other issues raised by the Court.

The organization of this technical memorandum is as follows:

- Section 1.0, Introduction, explains why this technical memorandum was prepared and what it analyzes.
- Section 2.0, Summary of Analysis Results, presents a condensed version of the findings of the analysis.
- Section 3.0, Methodology and Approach, identifies the four construction sequences analyzed and the variables considered.
- Section 4.0, Results of the Analysis, presents the detailed results for all sequences and variables over the period of analysis.
- Section 5.0, Comparison of Impacts by Construction Sequence, compares the scenarios with respect to several categories of impacts.
- Section 6.0, Conclusions, presents the conclusions of the analysis.
- Attachments 1 through 6 provide supplemental information.

2.0 Summary of Analysis Results

2.1 Description of Scenarios

Four construction-sequencing scenarios[1] were developed for the sequencing analysis:

- Scenario 1
  - Construct Maximum Future Transit first
  - Reconstruct I-15 second
  - Construct Legacy Parkway third
- Scenario 2
  - Construct Maximum Future Transit first
  - Construct Legacy Parkway second
  - Reconstruct I-15 third
- Scenario 3
  - Construct Maximum Future Transit and Legacy Parkway concurrently
  - Reconstruct I-15 last
- Scenario 4
  - Construct Legacy Parkway first
  - Construct Maximum Future Transit second
  - Reconstruct I-15 third

Scenario 1 is included to help determine whether the conclusion of the Final EIS—that reconstructing I-15 before constructing the Legacy Parkway was not a practical alternative—is still valid. To make this determination, Scenario 1 evaluates whether the Maximum Future Transit component of the Shared Solution would meet enough of the North Corridor travel demand that I-15 could be reconstructed before the construction of the Parkway without causing an unacceptable level of congestion on I-15.

Scenarios 2, 3, and 4 are included to compare the impacts of constructing Maximum Future Transit before, concurrent with, or after constructing the Legacy Parkway, respectively. Further aspects of integration are addressed in a separate document: *Integration of Highways and Transit in the North Corridor Technical Memorandum*.

[1] These scenarios are not evaluated with regard to community preference, budget, feasibility, or any other factors.

Each of the three major components is assumed to be fully operational at the end of the construction period. This assumption is particularly important for Maximum Reasonable Transit because some of its elements,[2] specifically transit-oriented land use, would in reality take several years to be fully functional. This assumption lets the reader see what the full potential benefit of transit could be on meeting travel demand without having to factor in its implementation over an extended period of time and whether or not the construction of the Legacy Parkway can reasonably be delayed.

2.2 Summary of Impacts

Three different comparisons were made among these four scenarios. These comparisons are shown in Section 5, Comparison of Impacts by Construction Sequence Scenario. The results of these comparisons are summarized in the following sections.

2.2.1 Comparison of Scenarios 3 and 4

The comparison of Scenarios 3 and 4 analyzes the impacts of constructing Maximum Future Transit concurrent with or after constructing the Legacy Parkway.

The results of this analysis conclude that Scenarios 3 and 4 have similar *environmental* impacts. Because these impacts are so similar, the tradeoffs between these two scenarios and Scenarios 1 and 2 can be illustrated using Scenario 3 only (construct Maximum Future Transit and Legacy Parkway concurrently and reconstruct I-15 last). As a result, Scenario 4 (construct Legacy Parkway first, Maximum Future Transit second, and I-15 third) is not compared to Scenarios 1 and 2. Complete data on Scenario 4 is presented in Section 5.1, Comparison of Scenarios 3 and 4, and the attachments to this technical memorandum.

2.2.2 Comparison of Scenarios 1 and 3

The comparison of Scenarios 1 and 3 analyzes the impacts of reconstructing I-15 before constructing the Legacy Parkway. This comparison is needed to determine if Maximum Future Transit would prevent enough congestion in the North Corridor that reconstructing I-15 before constructing the Legacy Parkway would be a practicable alternative.

[2] The complete list all of these elements is provided in Section 4.1 of this technical memorandum.

The comparison of these two scenarios shows that, compared to Scenario 1 (construct Maximum Future Transit first, I-15 second, and Legacy Parkway third), Scenario 3 (construct Maximum Future Transit and Legacy Parkway concurrently and I-15 last) provides the following benefits:

- Faster travel times for the traveling public
- Lower costs to the traveling public
- Quicker protection of the Legacy Nature Preserve from the impacts of development[3]
- Quicker restoration of the Legacy Nature Preserve's wetlands and wildlife habitat
- Fewer crashes on side streets and arterials[4]
- Less stress on the traveling public (expressed as a higher level of service)
- Reduced air emissions because of reduced congestion (although all scenarios would be in conformance with air quality regulations)[5]
- Reduced energy use because of reduced congestion[6]

Conversely, compared to Scenario 3, Scenario 1 provides the following benefits:

- A delay in impacts to wetlands

[3] This conclusion assumes that no impacts to wetlands have already occurred and that no mitigation has occurred (see Section 3.4.1 of this document).

[4] Decreased congestion decreases the crash potential on side streets and arterials. Chapter 1, Table 1-4, of the Legacy Parkway Supplemental EIS identifies traffic crash rates for different types of roadways.

[5] Normally, air emissions increase with the speed of the vehicle. However, under Scenario 1, the travel times on I-15 during its reconstruction are so slow that air emissions actually increase compared to Scenario 3. This occurs even though a lot of traffic diverts to local streets and arterials to avoid congestion on I-15. Also see Section 3.4.8 of this document.

[6] The energy and air emission analysis includes traffic on the major collectors and arterials where travelers would divert to avoid congestion on I-15.

2.2.3 Comparison of Scenarios 2 and 3

The comparison of Scenarios 2 and 3 analyzes the impacts of constructing Maximum Future Transit either before or concurrent with constructing the Legacy Parkway. This comparison is needed to determine if constructing Maximum Future Transit is a practicable alternative.

The comparison of these scenarios shows that, compared to Scenario 2 (construct Maximum Future Transit first, Legacy Parkway second, and I-15 third), Scenario 3 (construct Maximum Future Transit and Legacy Parkway concurrently and I-15 last) provides the following benefits:

- Faster travel times for the traveling public
- Lower costs to the traveling public
- Quicker protection of the Legacy Nature Preserve from the impacts of development[7]
- Quicker restoration of the Legacy Nature Preserve's wetlands and wildlife habitat
- Fewer crashes on side streets and arterials
- Less stress on the traveling public (expressed as a higher level of service)
- Reduced energy usage because of reduced congestion

Conversely, compared to Scenario 3, Scenario 2 provides the following benefits:

- A delay in impacts to wetlands
- Reduced air emissions because of reduced speeds (although all scenarios would be in conformance with air quality regulations)

[7] This conclusion assumes that no impacts to wetlands have already occurred (see Section 3.4.1 of this document).

3.0 Approach to Sequencing

3.1 Previous Sequencing Analysis

The sequencing analysis for the 2000 Final EIS was conducted to address the practicability of reconstructing I-15 before constructing the Legacy Parkway in order to delay the wetland impacts from constructing the Legacy Parkway. The FEIS concluded that both reconstructing I-15 and constructing the Legacy Parkway would be needed to meet the future travel demand in the North Corridor. Because of the need for both projects, the sequencing options were compared using factors other than meeting travel demand.

Appendix G of the Final EIS analyzed two sequencing options for the North Corridor projects:

- Build Legacy Parkway first and reconstruct I-15 later
- Reconstruct I-15 first and build Legacy Parkway later

Although the Shared Solution in the Final EIS includes Maximum Future Transit, the previous sequencing analysis addressed only the sequencing of I-15 and Legacy Parkway. The analysis concluded that reconstructing I-15 before constructing the Legacy Parkway was not a practicable alternative because the cost to the traveling public would be too great.

3.2 Sequencing for the Supplemental EIS

The analysis in this technical memorandum includes the three major components of the Shared Solution: I-15 improvements, the Legacy Parkway, and a new Maximum Future Transit as specified in the technical memorandum *Integration of Highways and Transit in the North Corridor* (Integration Technical Memorandum). The lead federal agencies that guided the preparation of this sequencing technical memorandum selected the four scenarios that are evaluated. The four scenarios were identified previously in Section 2.1, Description of Scenarios. The scenarios cover the reasonable range of options for sequencing the major components of the Shared Solution and address the same sequencing issues as those considered in the Final EIS.

Information identifying the four scenarios, including a detailed description of the three major project components of each scenario, was presented to the Community and Planning Information Committee (CPIC) on November 5, 2003. CPIC was also informed that each scenario would cover a 10-year timeframe from 2005 to 2015 and that the sequencing issues considered would include those

analyzed in the Final EIS. Members of CPIC were given the opportunity to ask questions and provide comments.

The major comment from some CPIC members was to include other alternatives in the sequencing analysis. Two alternatives were considered as a part of the NEPA alternatives analysis: a Redwood Road expressway and a "robust" Redwood Road expanded arterial similar to the Bangerter Highway. These alternatives were eliminated from detailed evaluation in the Supplemental EIS and therefore were not included as components of the Shared Solution. For this reason, they were also excluded from the sequencing analysis.

3.3 Objective of this Analysis

The objective of this sequencing analysis is to provide information on different construction sequences for the three major components of the Shared Solution to help determine whether one or both of the following scenarios are practicable:

- Delaying construction of the Legacy Parkway until I-15 has been reconstructed
- Delaying construction of the Legacy Parkway until the Maximum Future Transit component of the Shared Solution has been constructed

This technical memorandum does not make a recommendation in favor of either scenario; it simply points out the different impacts between the scenarios.

3.4 Description of Analysis

In April 2003, FHWA and USACE conducted agency and public scoping. A few of the issues that were raised concerning sequencing, such as congestion, were relevant to the question of project sequencing and are therefore addressed in the sequencing analysis.

The geographic area considered for comparing alternative sequencing scenarios is the same area considered in the sequencing analysis in the Final EIS. The area is bounded by the interchange of I-15 and I-215 on the south and the interchange of US 89 and I-15 on the north. This area is extremely narrow with the Great Salt Lake providing a barrier to the west and the local communities and the Wasatch Mountains providing a barrier to the east. I-15 is the only major continuous north-south roadway through the corridor. Therefore, when crashes and congestion occur on I-15 traffic is forced onto local streets in the corridor.

Each scenario consists of continuous construction of transportation improvements over a 10-year period from 2005 to 2015. Unless otherwise noted, this analysis assumes that when one project is completed, the next project begins.

Within the 2005-to-2015 construction period, travel demand was modeled for two years as described in Attachment 1, Legacy Parkway Sequencing Model Summary. These two years, 2007 and 2012, are used to estimate traffic for two periods of time within the 10 years as follows:

- Year 2007 results are assumed to represent conditions from 2005 through 2009.
- Year 2012 results are assumed to represent conditions from 2010 through 2014.

A similar approach was used in the sequencing analysis reported in Appendix G of the Final EIS in which a single year, 2005, was modeled and the results were used to represent conditions during a 7-year construction period from 2002 to 2008.

The Maximum Future Transit component in the sequencing analysis was developed through the Legacy Parkway Integration Analysis, which formulated and evaluated transit improvements in addition to those included in the WFRC LRP. These improvements include more frequent transit service, improved quality of service, transit-supportive land use, and transit-supportive pricing policies.

The I-15 reconstruction project used in this sequencing analysis is described in detail in the I-15 North Corridor Draft Environmental Impact Statement, December 1998. The Legacy Parkway project used in this sequencing analysis is Alternative E as described in Section 3.4.2 of the Supplemental EIS. Unless otherwise stated, analysis was done using only the three major components of the Shared Solution.

For each of the four sequencing scenarios, the following variables are examined as part of this sequencing analysis:

- Timing of direct wetland impacts
- Costs to the traveling public
- Travel speeds on I-15
- Travel times through the corridor using I-15, Maximum Future Transit, and Legacy Parkway
- Level of service on highways
- Capacity compared to demand
- Peak period energy usage
- The total amount of air pollutants emitted during the peak period
- Costs of construction expressed in 2003 dollars
- Operating and maintenance costs

3.4.1 Timing of Direct Wetland Impacts

Wetland impacts are analyzed because wetlands are one of the resources of primary interest under Section 404 of the Clean Water Act. Direct wetland impacts are estimated for the Maximum Future Transit construction, Legacy Parkway construction, and I-15 reconstruction. The amount of affected wetland is the estimated amount of wetlands within the right-of-way. This analysis assumes that physical impacts to all of the wetlands within the right-of-way occur during the first year of a project's construction. The analysis also assumes that none of the impacts to wetlands have occurred and that none of the mitigation (that is, the Legacy Nature Preserve) has occurred.

For purpose of this analysis, delays in direct wetland impacts are assumed to be environmentally beneficial. Delays are assumed to allow the 113 acres of wetlands directly impacted by the Legacy Parkway to continue their existing functions for 3 to 7 years, depending on the scenario, until the project is constructed. These functions include wildlife, flood storage, and water quality benefits. This analysis further assumes that there are no other impacts to the wetlands during the delay period, although this assumption ignores the recognized potential for wetlands to be affected by ongoing private development. This analysis also includes the adverse impacts from delaying implementation of the Legacy Nature Preserve.

Although wetland impacts have already occurred due to the initiation of construction of the Legacy Parkway, and these impacts have been mitigated by the Nature Preserve, in the event of a protracted legal case or Section 404 decision process, the Corps could require the impacted wetlands to be restored. As a result, the Nature Preserve would no longer be needed as mitigation and UDOT would likely excess the property which would put the current wetlands within the preserve at risk of being developed.

The wetland impacts for the major components of the Shared Solution have been calculated in supporting studies for the Legacy Parkway Supplemental EIS, the I-15 North Corridor Draft EIS, and the Commuter Rail Draft EIS. However, these studies might underestimate the wetland impacts of Maximum Future Transit because the wetland impacts of some components of this transit have not been determined. These impacts for some components of Maximum Future Transit cannot be determined because it has not been defined in enough detail to allow them to be determined. However, given the potential location of these components, the impacts are likely to be minor. As in the Legacy Parkway Final EIS, land use impacts to wetlands are not included as project impacts because, according to officials with Davis County, the study area will be essentially built out by 2030 with or without Legacy Parkway (Sommerkorn 2004).

3.4.2 Costs to the Traveling Public

Costs to the traveling public are analyzed for each scenario because they directly reflect the efficiency of travel. For this analysis, the costs to the traveling public for I-15 and Legacy Parkway are assumed to consist of the value of time spent traveling through the corridor as well as the cost of the energy (fuel) used. Attachment 2, Value of Travel Time, explains how the value of travel time was determined, including the assumptions used.

For Maximum Future Transit, the cost to the traveling public is assumed to be the value of time spent traveling through the corridor plus the cost of fares. Fares are the same as used for the Integration Analysis ($0.75, with no premium fares). The cost of energy is assumed to be included in the cost of fares.

The value of travel time during the peak period is estimated by multiplying the time it takes to travel through the corridor by the volume of traffic (or transit ridership) and by the value of the travelers' time expressed in dollars per hour.

For the cost of energy usage, a representative dollars-per-gallon value of fuel is estimated and multiplied by the energy usage estimate.

3.4.3 Travel Speeds on I-15

Travel speeds are analyzed because they reflect congestion that exists on a roadway and the amount of inconvenience that a traveler may experience. The WFRC traffic model estimates vehicle speeds between specific points in the roadway system during the 3-hour afternoon peak period for northbound traffic. To determine an average speed to travel through the North Corridor, the speeds are weighted by the mileage in each segment of the North Corridor.

3.4.4 Travel Times on I-15, Maximum Future Transit, and Legacy Parkway

As with travel speeds, travel times are analyzed because they reflect congestion on a roadway and the amount of inconvenience to a traveler. Travel times (in minutes) are estimated during the 3-hour afternoon peak period for northbound traffic. The WFRC traffic model estimates vehicle speeds for each segment within the roadway system. Using distances and speeds, travel times for each segment are estimated for travel on I-15, Maximum Future Transit, and Legacy Parkway. The total times for each scenario are the sums of the travel times for each segment for travel on the three projects through the North Corridor. Maximum travel times for transit include station dwell times which report slower transit speeds as compared to the speed of travel of the transit vehicles.

Calculations of travel times in this analysis differ from those in the *Salt Lake and Ogden-Layton Urbanized Areas Congestion Management System*.[8] The sequencing analysis compares total travel times while the Congestion Management System calculates delay, which is the additional commute time during congestion (travel time during congestion – free flow travel time = delay time). Both analyses use the peak period travel for comparison purposes.

3.4.5 Level of Service on Highways

Level of service (LOS) is analyzed because it is a well-known measure of roadway congestion. Six levels of service ranging from LOS A to LOS F are used to define congestion with LOS A representing the most free-flowing conditions and LOS F representing stop-and-go traffic nearing a system failure. Level of service is estimated for northbound lanes of traffic on I-15 during the afternoon peak hour. While the purpose and need for the project is based on the level of service in the afternoon peak period, the sequencing analysis uses the peak hour because it reflects the greatest congestion the public can expect with each scenario.

Level of service is also an indirect reflection of roadway safety. For instance, the greater the congestion on I-15, the more traffic will be diverted to the arterial streets. This diversion will result in a higher crash rates because, based on data provided by UDOT (2003), arterials are less safe than freeways.

3.4.6 Capacity Compared to Demand

Another way to determine whether the needs of the traveling public are being met is to show the capacity of all the components versus the travel demand. Curves were plotted for each of the four construction-sequencing scenarios (see Section 2.1, Description of Scenarios) using a travel demand curve developed with the WFRC travel demand model for the Woods Cross screenline and based on three different years (2007, 2012, and 2020). The curves show the capacity added over time by the components of each scenario and indicate whether the capacity provided by each scenario meets the projected demand.

The travel models were used to code highway capacities and speeds according to observable data and procedures outlined in the Highway Capacity Manual (2000 Edition). Highway capacities ranged from 600 vehicles per lane per hour for collector streets to 2,200 vehicles per lane per hour for freeways. Free-flow speeds on I-15 were changed from 65 mph (both existing and future) to 60 mph during the reconstruction period. Transit capacities are somewhat unlimited from

[8] Salt Lake and Ogden-Layton Urbanized Areas Congestion Management System, Wasatch Front Regional Council, June 2004.

a modeling perspective, but capacities were assumed to be equal to demand for analysis purposes. The maximum achievable transit demand in the sequencing analysis was 991 passenger car equivalents per hour (in the peak hour peak direction) based on the WFRC travel demand model. Reported values in the sequencing analysis reflect total demand through the North Corridor and would be different from the value for a given screenline.

3.4.7 Peak Period Energy Usage under Each Scenario

The afternoon peak period energy usage is analyzed to compare the energy efficiency of each scenario. The analysis includes energy used on all major roads in the North Corridor, not just I-15 and the Legacy Parkway, added to the estimated energy usage by transit. For vehicles, energy usage is measured based on the type of vehicle (auto or truck) and its speed. For transit, energy usage is based on fuel efficiency and is the sum of energy used by rail and buses. See Attachment 3, Energy Use, for the assumptions underlying this energy analysis and detailed calculations of energy usage.

3.4.8 Total Amount of Air Pollutants Emitted during the Peak Period under Each Scenario

Total emissions are analyzed as a measure of the air emission efficiency of each scenario. Four pollutants are analyzed: volatile organic compounds (VOCs), carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter (PM_{10}).[9] For comparative purposes, the emission factors for this analysis are assumed to be constant from 2005 to 2015. Generally, these factors would be expected to decrease over time with improving emission technologies.

The emissions of the four pollutants are estimated based on the total number of vehicles using all of the major roads in the North Corridor during the peak period, their speed, and the pollutant generation factors of each pollutant for vehicles, buses, and commuter rail. Calculations of air emissions are made for vehicles using each of the three major components of the Shared Solution plus arterials and collector roads. As a result, air emissions calculations capture emissions from vehicles that divert to local streets as congestion increases on I-15. The balance of air emissions on the total airshed over the study area is not calculated.

The National Ambient Air Quality Standards (NAAQS) for regional conformity are probably met for all scenarios in the year 2020. This belief is based on the most recent WFRC conformity determination for the 2030 LRP which includes

[9] Refer to the Air Quality Sections of the Legacy Parkway Final EIS (2000) or the evaluations prepared for the Supplemental EIS for further identification and discussion of these pollutants.

all of the Shared Solution except a few of the components from Maximum Future Transit. See Attachment 4, Air Quality Analysis, for the assumptions underlying this emissions analysis and the detailed calculations of emission generation.

3.4.9 Costs of Construction under Each Scenario, Expressed in 2003 Dollars

Construction costs are analyzed because they are a common way to measure capital investment. **Inflation, which could cause these costs to increase over time, has not been considered in these costs.** By not factoring in inflation, costs in future years might be understated.

The estimated cost of I-15 reconstruction is $951 million over 4 years, or about $238 million per year.[10] This is the average of the estimated cost cited in the original I-15 North Corridor Draft EIS and a preliminary estimate developed by HDR Engineering, Inc. as part of the re-evaluation of the I-15 EIS.

The estimated cost of the Legacy Parkway project is $426 million over 3 years, or about $142 million per year. This estimate is for Alternative E as described in the Supplemental EIS. The estimated cost of Maximum Future Transit is $406 million over 3 years, or about $135 million per year. This estimate was developed in conjunction with the Utah Transit Authority.

3.4.10 Operating and Maintenance Costs

The costs to operate and maintain a transportation project, including the facilities needed to support its operation, are related to construction costs and are analyzed for the same reason. Operating costs include the labor and material necessary to operate each of the three major transportation projects in the Shared Solution. Maintenance costs include the labor, material, and equipment needed to keep the transportation projects functioning. Operating and maintenance (O&M) costs for Maximum Future Transit were obtained from the Utah Transit Authority.

[10] Cost estimate for reconstruction of I-15 as calculated in Appendix A of the I-15 North Corridor: Downtown Salt Lake City to Kaysville Draft EIS, FHWA, 1998.

4.0 Results of the Analysis

4.1 Summary of Integration Analysis

The Maximum Reasonable Future Transit project used in the sequencing analysis was developed during the integration analysis. It is summarized here to identify the transit elements and transit supporting elements included in this project.

As described more fully in the Integration Technical Memorandum, two integration packages, Package A and Package B, were examined for the purposes of defining Robust Transit. The two packages shared the following measures:

- Double the commuter rail frequency over that defined in the LRP.
- Increase local bus service and improve the ability to feed transit.
- Provide bus rapid transit along the main streets east of I-15 to operate between Farmington and Salt Lake City.
- Provide “seamless” transfers between buses and trains.
- Improve transit access.
- Reduce fares for premium transit.

The primary differences between the two packages are as follows:

- In Package A, land uses are considered as described in the LRP; in Package B, transit-supportive land uses are included along the corridor.
- Parking costs for Package B are double those of Package A.

Both packages would result in increased transit usage beyond that which could be achieved by the LRP: Package A was estimated to increase the transit mode share from 4.8% to 5.0%; Package B was estimated to increase the transit mode share from 4.8% to 5.3%. Package B represents a 10% increase over the transit mode share achieved with the 2020 baseline value in the LRP. This sequencing analysis was conducted using Integration Package B.

4.2 Sequencing

The results of the analysis of four alternative sequencing scenarios are shown in Tables 5-1 through 5-4 of Attachment 5, Scenario Summary Tables. These tables identify the sequence of construction of each project within the scenario and the impacts to the variables described in Section 3.4, Description of Analysis. The comparison of the impacts of each scenario is shown in Section 5.0, Comparison of Impacts by Construction Sequence Scenario.

The traffic speeds and travel times shown for transit prior to 2008 are based on the existing transit system because the earliest that the commuter rail component of Maximum Future Transit can be operational is 2008. This is primarily based on the 3-year construction period and acquisition of heavy rail equipment required for commuter rail. This is true for all scenarios where existing conditions represent the initial construction period of the scenario. It is assumed for the purpose of this analysis that all components of Maximum Future Transit would become operational within this same 3-year timeframe.

The emissions figures used in the comparative discussions in Section 5.0 are a summation of all four pollutants. They have been combined for simplicity. For the individual pollutant emission results, see Attachment 6, Additional Comparison Figures.

5.0 Comparison of Impacts by Construction Sequence Scenario

5.1 Comparison of Scenarios 3 and 4

Scenario 3 consists of building Maximum Future Transit and Legacy Parkway simultaneously, followed by reconstruction of I-15. Scenario 4 consists of a build sequence of Legacy Parkway first, Maximum Future Transit second, and reconstruction of I-15 third. In Scenario 4, construction of Maximum Future Transit is delayed until 2008. The impacts of this delay are described below.

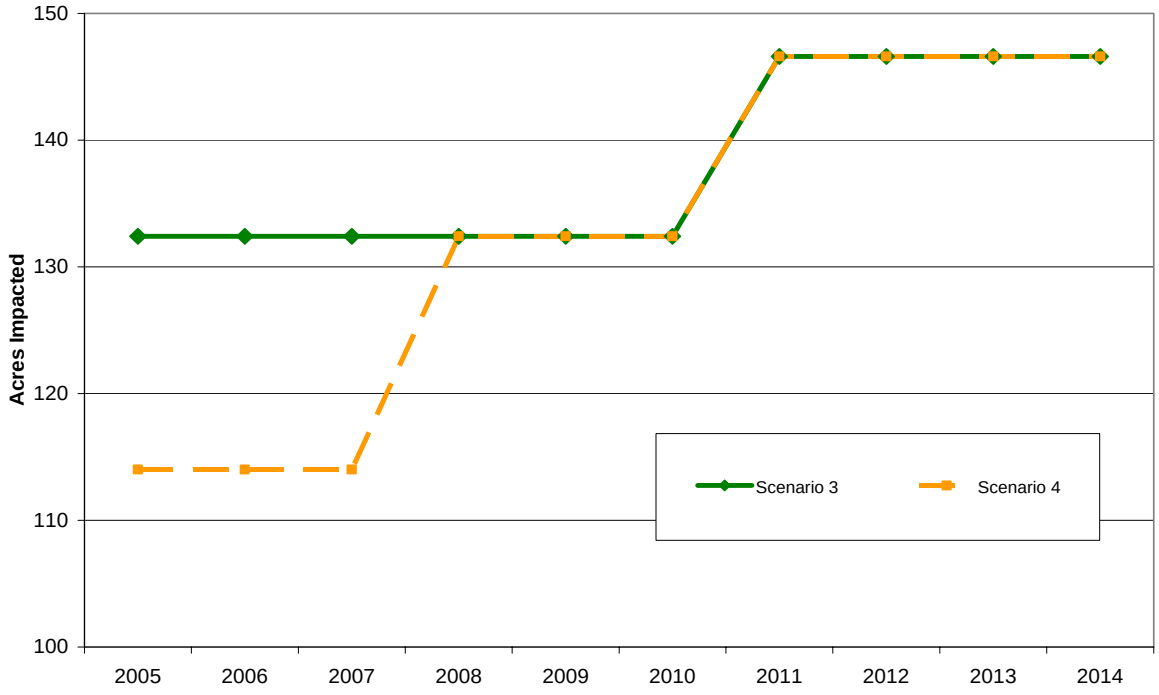
5.1.1 Wetlands

Scenarios 3 and 4 have the following impacts to wetlands (see Figure 5-1):

- Scenario 3
  - 131 acres (Maximum Future Transit and Legacy Parkway) in 2005
  - 15 acres more (I-15) in 2011
- Scenario 4
  - 113 acres (Legacy Parkway) in 2005
  - 18 acres more (Maximum Future Transit) in 2008
  - 15 acres more (I-15) in 2011
- Net delays in wetland impacts under Scenario 4
  - 18 acres from 2005 to 2008

The relatively minor delay in wetland impacts under Scenario 4 is due to delaying the initiation of construction of Maximum Future Transit until 2008.

Figure 5-1 Scenarios 3 and 4
Wetland Impacts



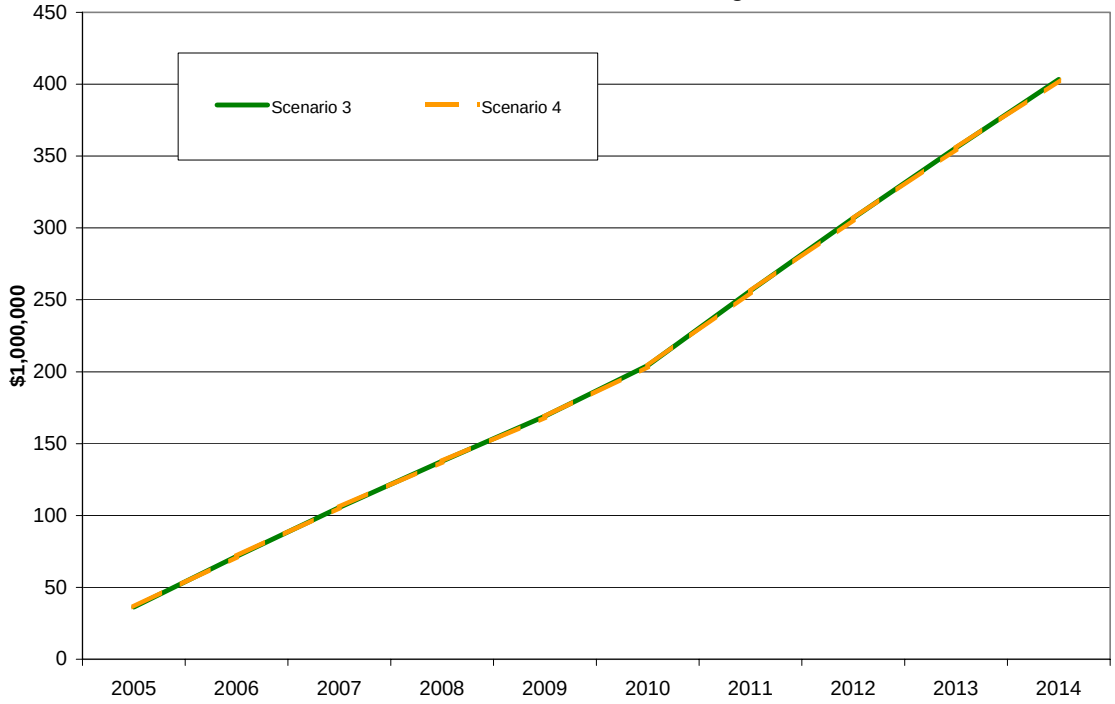
5.1.2 Costs to the Traveling Public

Scenarios 3 and 4 have the following similar impacts with respect to cumulative costs to the traveling public (see Figure 5-2):

- Scenario 3
  - $403.4 million (10-year total)
- Scenario 4
  - $402.8 million (10-year total)

There are relatively minor additional cumulative costs to the traveling public associated with Scenario 2 ($600,000 out of $403,000,000). For further figures comparing costs to the traveling public, see Attachment 6, Additional Comparison Figures.

Figure 5-2 Scenarios 3 and 4
Cumulative Costs to the Traveling Public



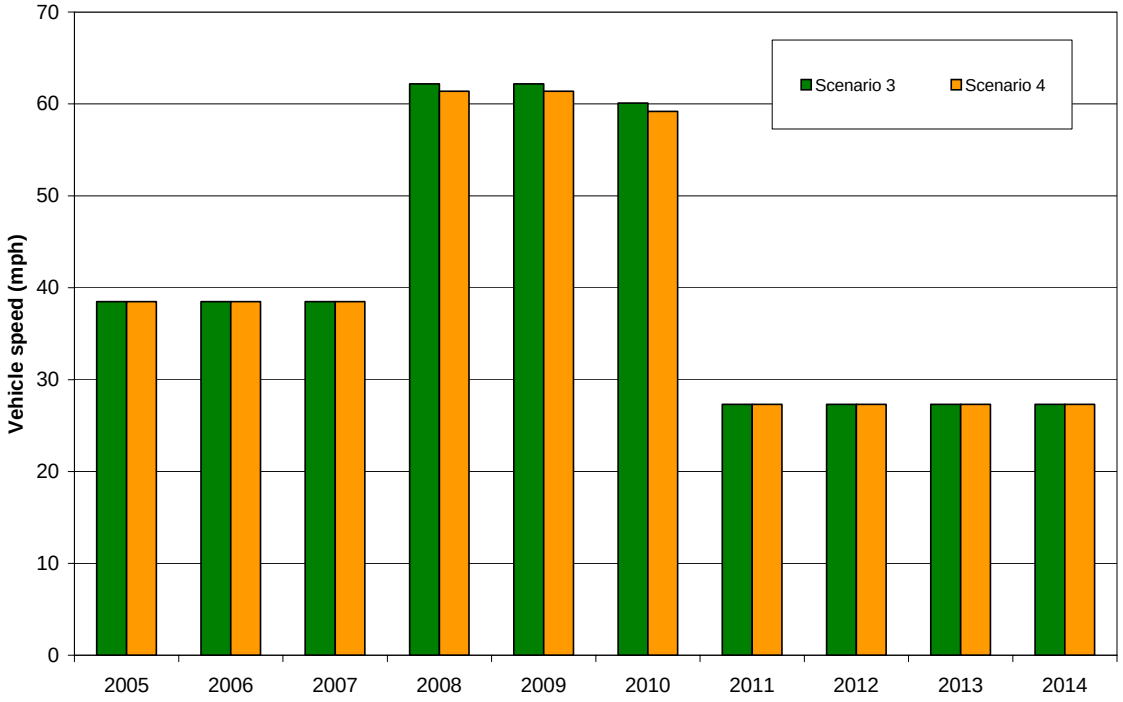
5.1.3 Average Speeds and Travel Times

Speeds and travel times are components of the calculation of costs to the traveling public. The following compares Scenarios 3 and 4 with respect to the average speeds and travel times on I-15 in the North Corridor (see Figures 5-3 and 5-4):

- Scenario 3
  - Average speed, 40.9 mph from 2005 to 2015
  - Average travel time, 16.9 minutes from 2005 to 2015
- Scenario 4
  - Average speed, 40.7 mph from 2005 to 2015
  - Average travel time, 17.0 minutes from 2005 to 2015

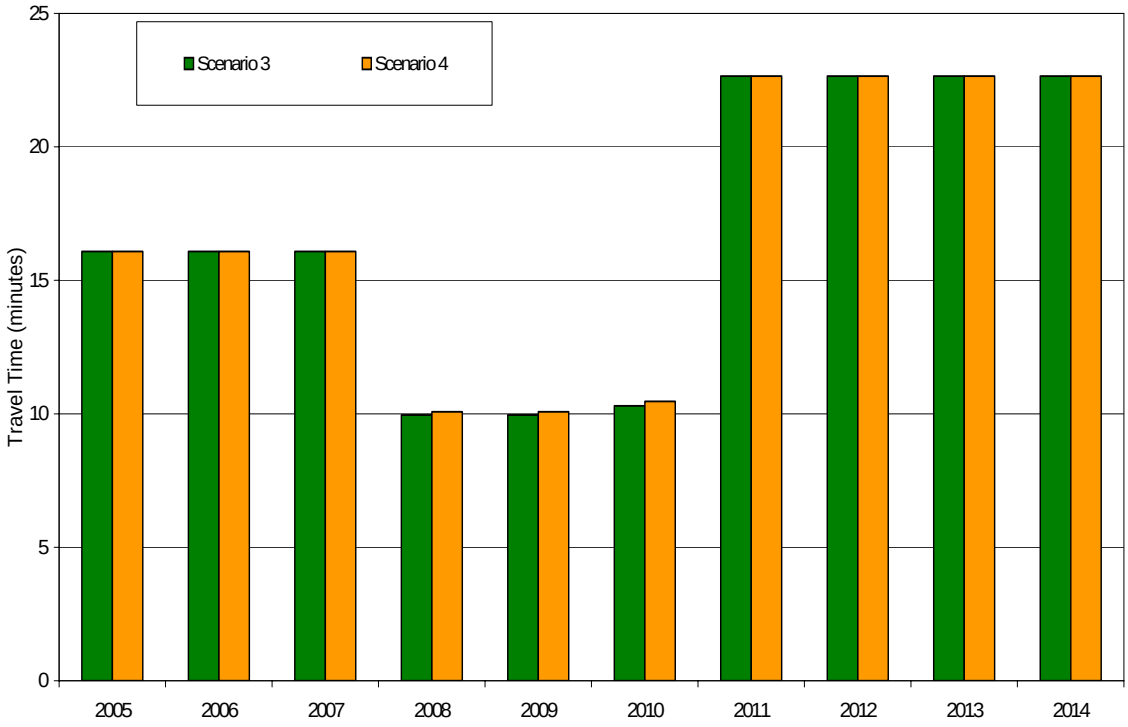
The relatively minor difference in travel speeds and travel times between the two scenarios results from the 3-year delay in constructing Maximum Future Transit. From this, it can be seen that Maximum Future Transit has essentially no effect on travel speeds and travel times on I-15.

Figure 5-3 Scenarios 3 and 4
Travel Speeds on I-15 Between US 89 and I-215 Interchange



For individual travel times per year on I-15, Legacy Parkway, and Maximum Future Transit, see Attachment 6, Additional Comparison Figures. Travel times in Figure 5-4 are for the afternoon peak period. The total travel time for the commuting public would be about twice this amount if the morning peak period were also taken into consideration.

Figure 5-4 Scenarios 3 and 4
Average I-15 Travel Times Between US 89 and I-215 Interchange



5.1.4 Level of Service

The following indicates that the level of service on I-15 is identical under Scenarios 3 and 4 for all study years and that the level of service for Legacy Parkway is identical under both scenarios for all study years (see Figures 5-5 and 5-6):

- Scenario 3
  - I-15
    - LOS F from 2005 to 2008
    - LOS D from 2008 to 2011
    - LOS F from 2011 to 2015
  - Legacy Parkway
    - LOS C from 2008 to 2009
    - LOS D in 2010
    - LOS F from 2011 to 2015
- Scenario 4
  - I-15
    - LOS F from 2005 to 2008
    - LOS D from 2008 to 2011
    - LOS F from 2011 to 2015
  - Legacy Parkway
    - LOS C from 2008 to 2009
    - LOS D in 2010
    - LOS F from 2011 to 2015

LOS F on I-15 from 2005 to 2008 reflects the current roadway system with travel demand calculated for 2007. LOS F on both roadways from 2011 to 2015 is the result of the increased congestion during the reconstruction of I-15. Similar to the comparison of travel speeds and travel times, the comparison of level of service under Scenarios 3 and 4 shows that transit has no effect on level of service on roadways in the North Corridor.

Figure 5-5 Scenarios 3 and 4
I-15 Level of Service

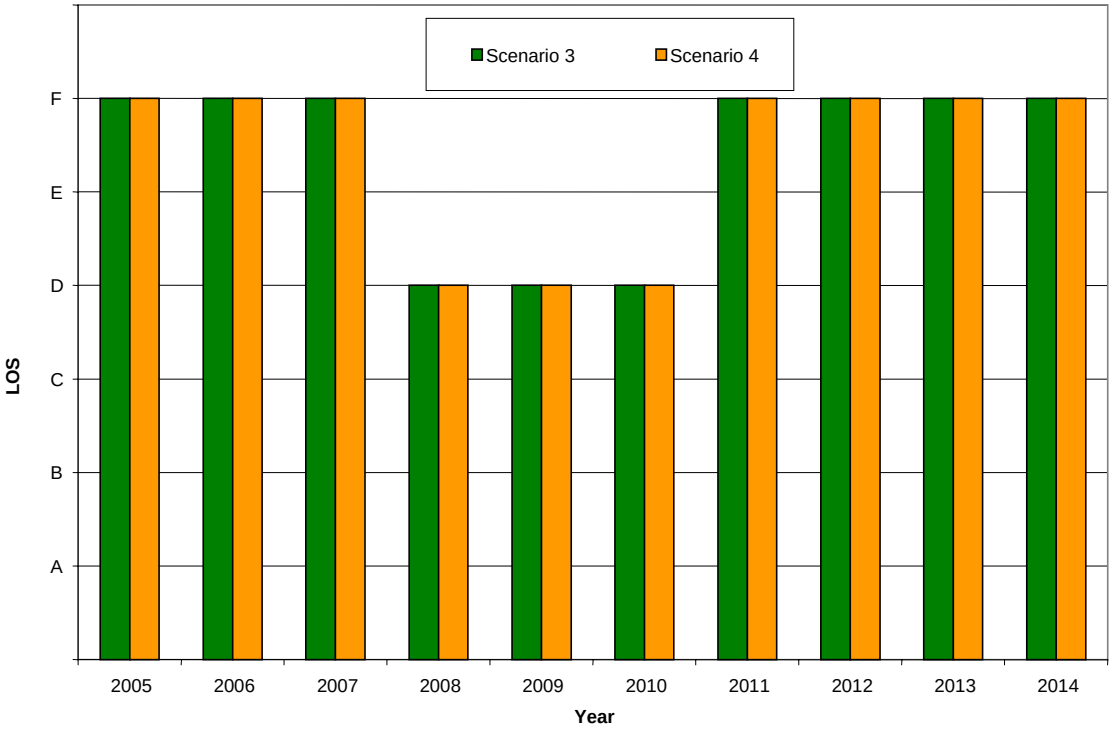
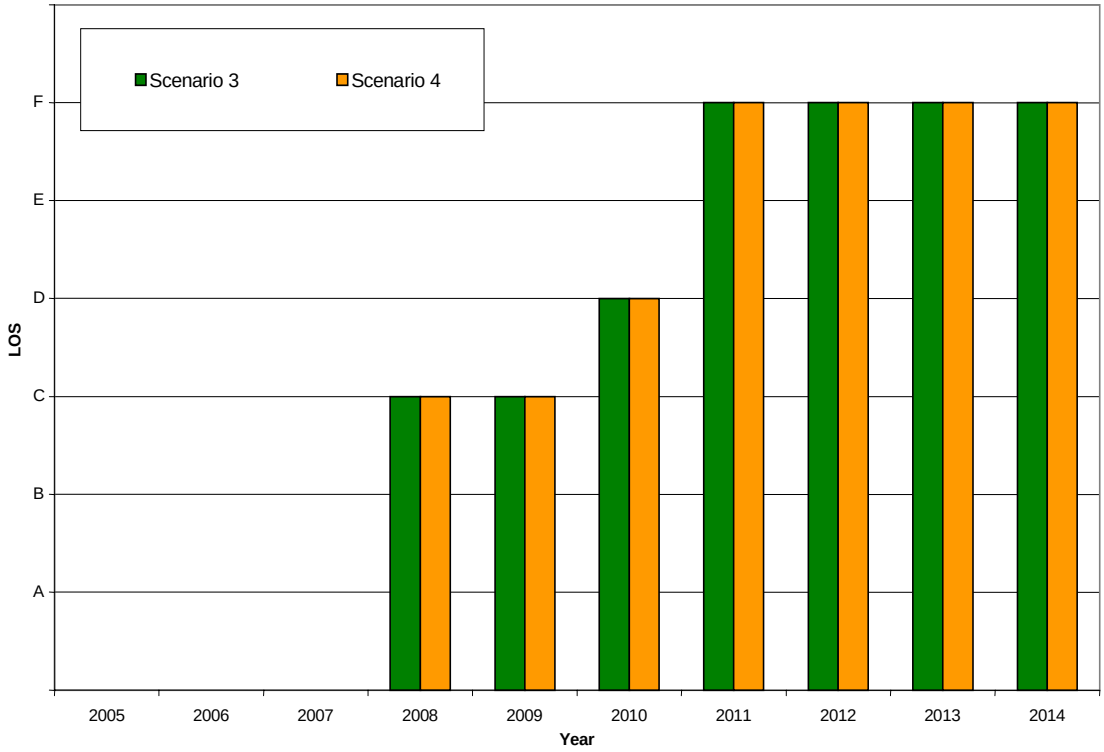


Figure 5-6 Scenarios 3 and 4
Legacy Level of Service



5.1.5 Capacity Compared to Demand

The following compares the capacities of Scenarios 3 and 4 to the travel demand for the years 2005 to 2020 (see Figure 5-7):

- Scenario 3
  - Capacity fails to meet demand from 2005 to 2008.
  - Capacity meets demand from 2008 to 2011.
  - Capacity fails to meet demand from 2011 to 2015.
  - Capacity meets demand from 2015 to 2020.
- Scenario 4
  - Capacity fails to meet demand from 2005 to 2008.
  - Capacity meets demand from 2008 to 2011.
  - Capacity fails to meet demand from 2011 to 2015.
  - Capacity meets demand from 2015 to 2020.

Both scenarios are the same relative to meeting demand. Scenario 3 has slightly greater capacity than Scenario 4 from 2008 to 2011 after Maximum Future Transit and Legacy Parkway have both been constructed; however, the capacity of both scenarios exceeds demand during this time. From 2011 to 2015, when I-15 is being reconstructed, neither scenario provides enough capacity to meet travel demand.

Figure 5-7 Scenarios 3 and 4
Available Capacity Compared to Estimated Demand

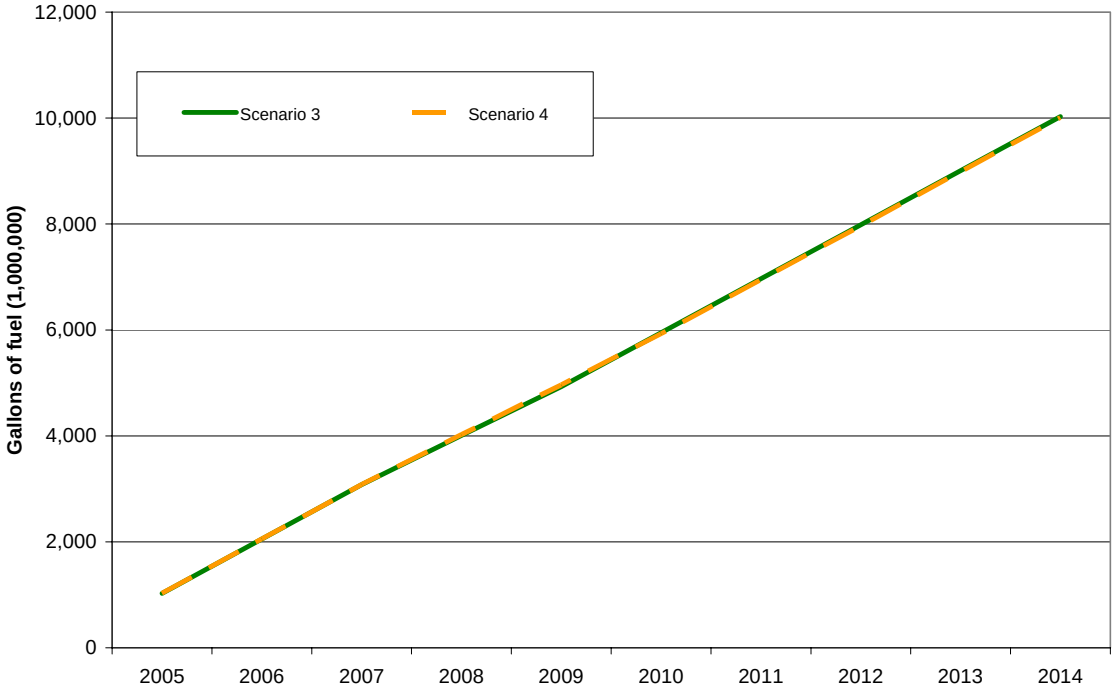
5.1.6 Energy Usage

Energy usage is measured as the consumption of fossil fuels by autos, trucks, and transit vehicles. For this analysis, cumulative use of this finite resource is estimated during the period 2005 to 2015. The following compares the cumulative consumption of energy under Scenarios 3 and 4 (see Figure 5-8):

- Scenario 3
  - 10.0 billion gallons of fuel consumed (10-year total)
- Scenario 4
  - 10.0 billion gallons of fuel consumed (10-year total)

Figure 5-8 reflects energy use for the evening peak period. The total energy used during the analysis period would nearly double if energy consumed in the morning peak period were included. This figure also demonstrates that most of the energy consumed is by vehicles on the roadway system. The inclusion of Maximum Future Transit in Scenario 3 has essentially no effect on the amount of energy consumed by either scenario.

Figure 5-8 Scenarios 3 and 4
Cumulative Energy Usage

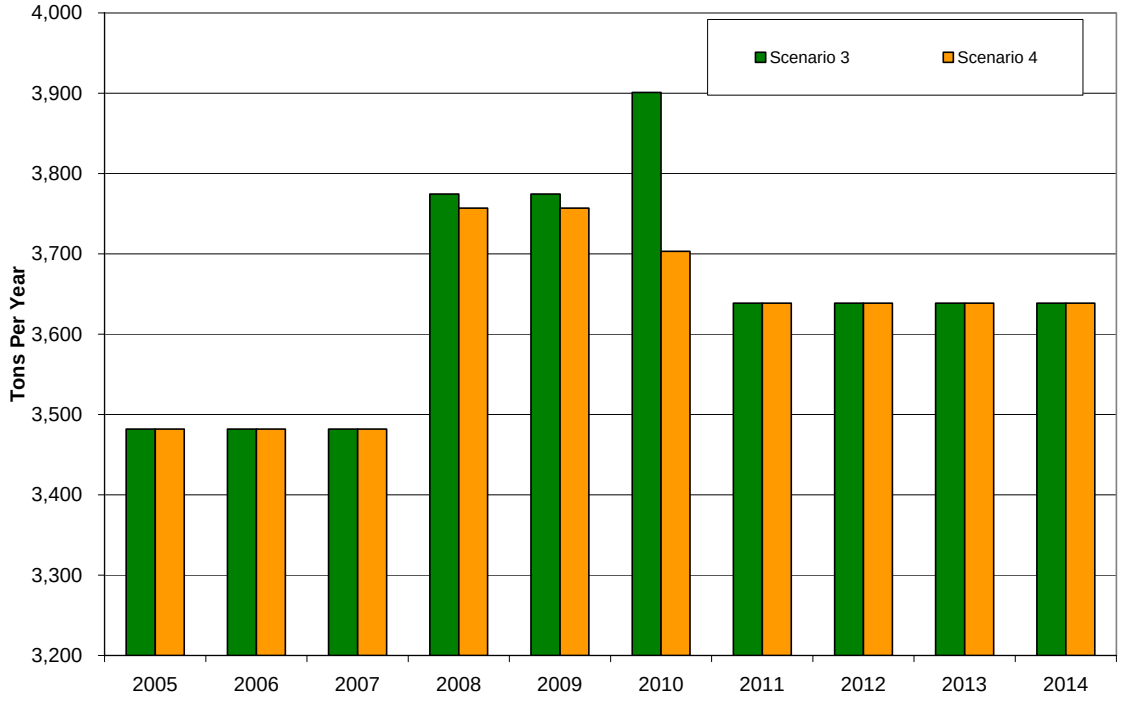


5.1.7 Air Emissions

The following compares the annual generation of air pollutants (total emissions of VOCs, CO, NO_x, and PM_{10}) under Scenarios 3 and 4 (see Figure 5-9):

- Scenario 3
  - 3,480 tons per year from 2005 to 2007
  - 3,780 tons per year from 2008 to 2009
  - 3,900 tons per year in 2010
  - 3,640 tons per year from 2011 to 2015
- Scenario 4
  - 3,480 tons per year from 2005 to 2007
  - 3,760 tons per year from 2008 to 2009
  - 3,700 tons per year in 2010
  - 3,640 tons per year from 2011 to 2015

Figure 5-9 Scenarios 3 and 4
Peak Period Air Emissions



Air emissions are the same for both scenarios in most years, excluding 2008 to 2010. The slight increase in air pollutants experienced with Scenario 3 compared to Scenario 4 is the result of the increased traffic that can be accommodated with Scenario 3 after the Legacy Parkway is completed. This result is coupled with the

fact that the congestion on I-15 is not substantial enough under Scenario 4 to cause a significant increase in air pollutants compared to Scenario 3.

Calculations of air pollutants in this analysis are for all of the major roads in the North Corridor, including the three major components of the Shared Solution. A balance of emissions to the airshed over the study area was not calculated.

As with energy usage, air emissions reflect those pollutants emitted during the evening peak period. The total difference in the amount of emissions during the analysis period would nearly double if the difference in emissions in the morning peak period were included. For the individual pollutants generated under Scenarios 3 and 4, see Attachment 6, Additional Comparison Figures.

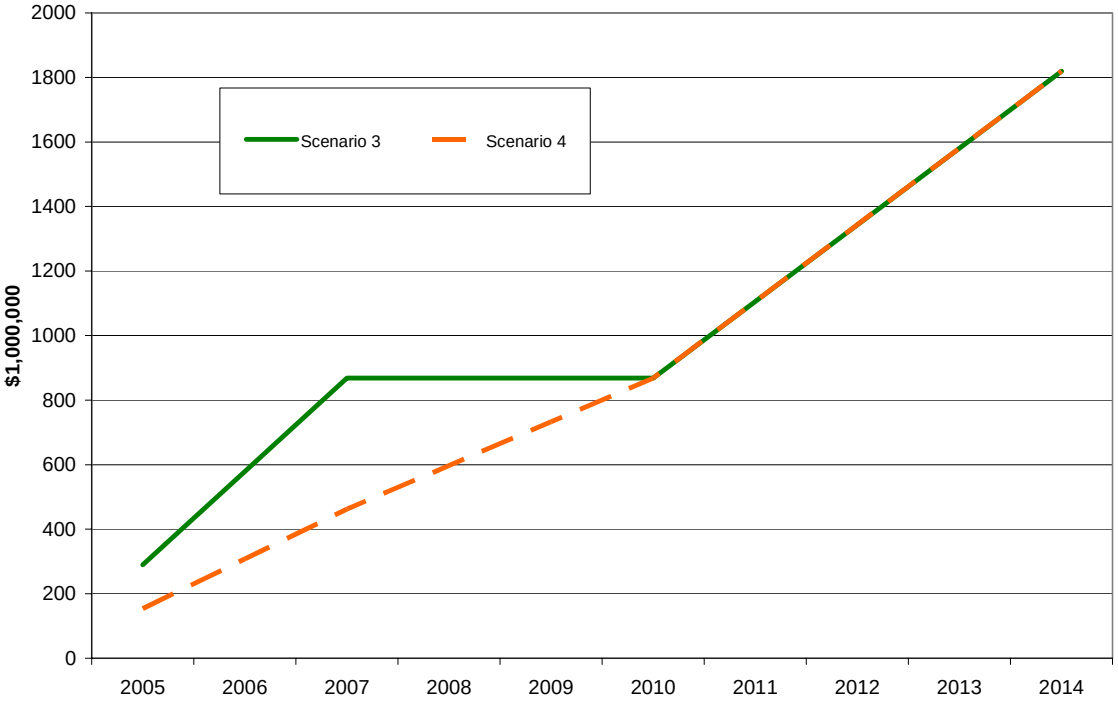
5.1.8 Construction Costs

The following summarizes the total cumulative construction costs for the Shared Solution under Scenarios 3 and 4 from 2005 to 2015 (see Figure 5-10):

- Scenario 3
  - $277 million per year from 2005 to 2008
  - $0 from 2008 to 2011
  - $238 million per year from 2011 to 2015
- Scenario 4
  - $142 million per year from 2005 to 2008
  - $135 million per year from 2008 to 2011
  - $238 million per year from 2011 to 2015

Scenario 3 shows a greater upfront cost than Scenario 4 because Maximum Future Transit and the Legacy Parkway would be under construction at the same time. If the rate of inflation is higher than state revenues, Scenario 3 could be a better investment strategy.

Figure 5-10 Scenarios 3 and 4
Cumulative Construction Costs



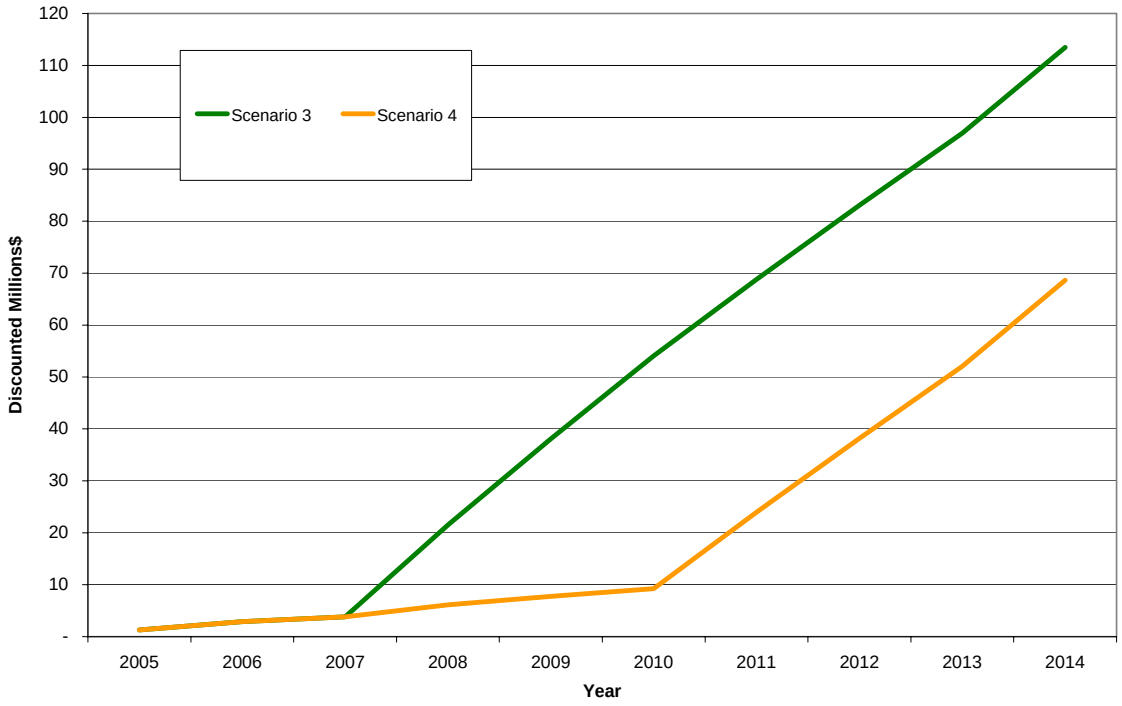
5.1.9 Operating and Maintenance Costs

The following compares the cumulative O&M costs under Scenarios 3 and 4 from 2005 to 2015 (see Figure 5-11):

- Scenario 3
  - $1 million per year from 2005 to 2008
  - $19 million per year from 2008 to 2011
  - $18 million per year from 2011 to 2014
  - $22 million per year from 2014 to 2015
- Scenario 4
  - $1 million per year from 2005 to 2008
  - $2 million per year from 2008 to 2011
  - $18 million per year from 2011 to 2014
  - $22 million per year from 2014 to 2015

Cumulative O&M costs differ under Scenarios 3 and 4 by about $44.9 million because Maximum Future Transit is operated and maintained 3 years longer under Scenario 3 than under Scenario 4.

Figure 5-11 Scenarios 3 and 4
Cummulative Operating & Maintenance Costs



5.1.10 Comparison Summary of Scenarios 3 and 4

The comparison of Scenarios 3 and 4 shows that they have very similar impacts to the environmental and to the traveling public. Because of these similarities, only Scenario 3 is used in the following comparisons with Scenarios 1 and 2. A comparison of Scenario 4 with Scenarios 1 and 2 would, with exception of construction costs and O&M costs, essentially be redundant and was therefore not included. Comparing only Scenario 3 with Scenarios 1 and 2 also focuses on the objective of the sequencing analysis, which is to determine whether one or both of the following scenarios are practicable:

- Delaying construction of Legacy Parkway until I-15 has been reconstructed
- Delaying construction of Legacy Parkway until Maximum Future Transit has been constructed

5.2 Comparison of Scenarios 1 and 3

Scenarios 1 and 3 are compared to determine whether the conclusion of the Final EIS—that reconstructing I-15 before constructing the Legacy Parkway was not a practicable alternative—is still valid. To make this determination, Scenario 1 evaluates whether Maximum Future Transit would meet enough of the North Corridor travel demand that I-15 could be reconstructed without causing an unacceptable level of congestion.

Scenario 1 consists of building Maximum Future Transit first, reconstructing I-15 second, and constructing the Legacy Parkway third. Scenario 3 consists of first building the Legacy Parkway and Maximum Future Transit simultaneously and then reconstructing I-15.

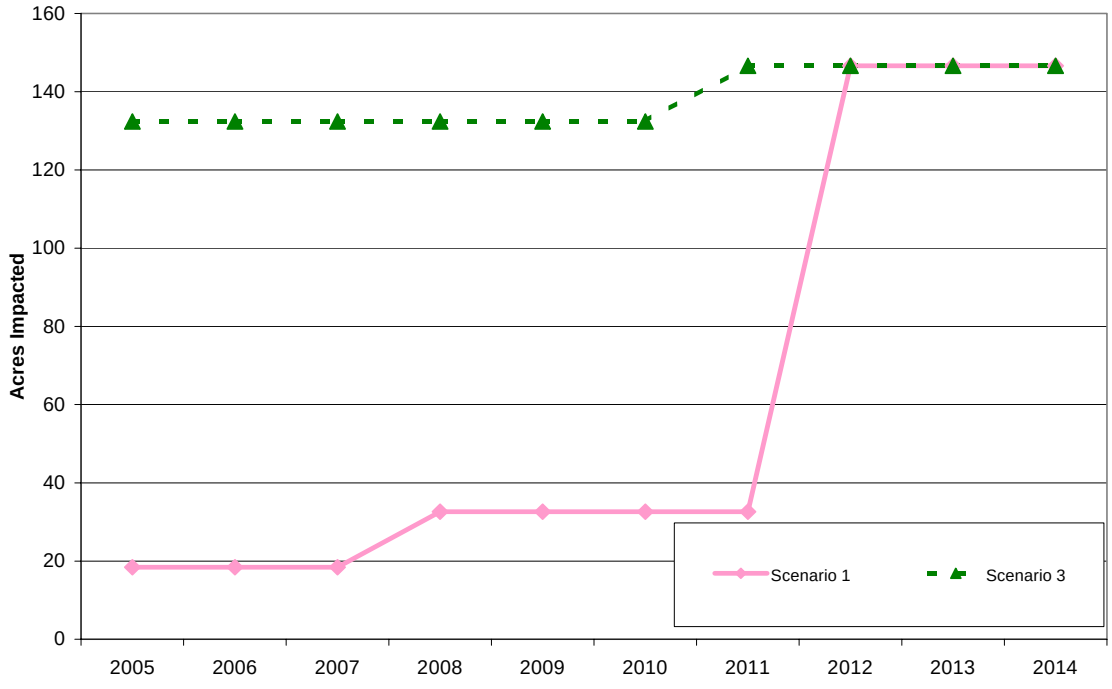
5.2.1 Wetlands

Scenarios 1 and 3 have the following impacts to wetlands (see Figure 5-12):

- Scenario 1
  - 18 acres (Maximum Future Transit) in 2005
  - 15 acres more (I-15) in 2008
  - 113 acres more (Legacy Parkway) in 2012
- Scenario 3
  - 131 acres (Maximum Future Transit and Legacy Parkway) in 2005
  - 15 acres more (I-15) in 2011
- Net delays in wetland impacts under Scenario 1
  - 113 acres from 2005 to 2008
  - 98 acres from 2008 to 2011

The total wetland impacts in the years 2012 to 2015 and beyond are the same for both scenarios.

Figure 5-12 Scenarios 1 and 3
Wetlands Impacts



Scenario 1 would result in a 7-year delay in the 113 acres of wetland impacts associated with the Legacy Parkway; however, 14 acres of wetland impacts will occur with the reconstruction of I-15 beginning in 2008. Consequently, only 99

acres of wetland impacts are actually delayed for 7 years. The 18 acres of wetland impacts resulting from Maximum Future Transit are a constant in both scenarios because it is the first project constructed in each scenario.

Delaying the impacts of the Legacy Parkway would result in certain benefits (preserving 113 acres of wetlands for 7 years) as well as the loss of benefits from preserving and restoring other wetlands in the Legacy Nature Preserve. The loss of these benefits has two components: (1) the benefits of preserving, restoring, and enhancing the wetlands in the Nature Preserve would be delayed for 7 years, and (2) the benefits could be lost or diminished permanently. During the 7-year delay of the Legacy Parkway, the mitigation decision could change. For instance, in the event of a protracted legal case or Section 404 decision process, the Corps could require the original wetlands to be restored. As a result, the Nature Preserve would no longer be needed as mitigation and the benefits from the Nature Preserve would be lost.

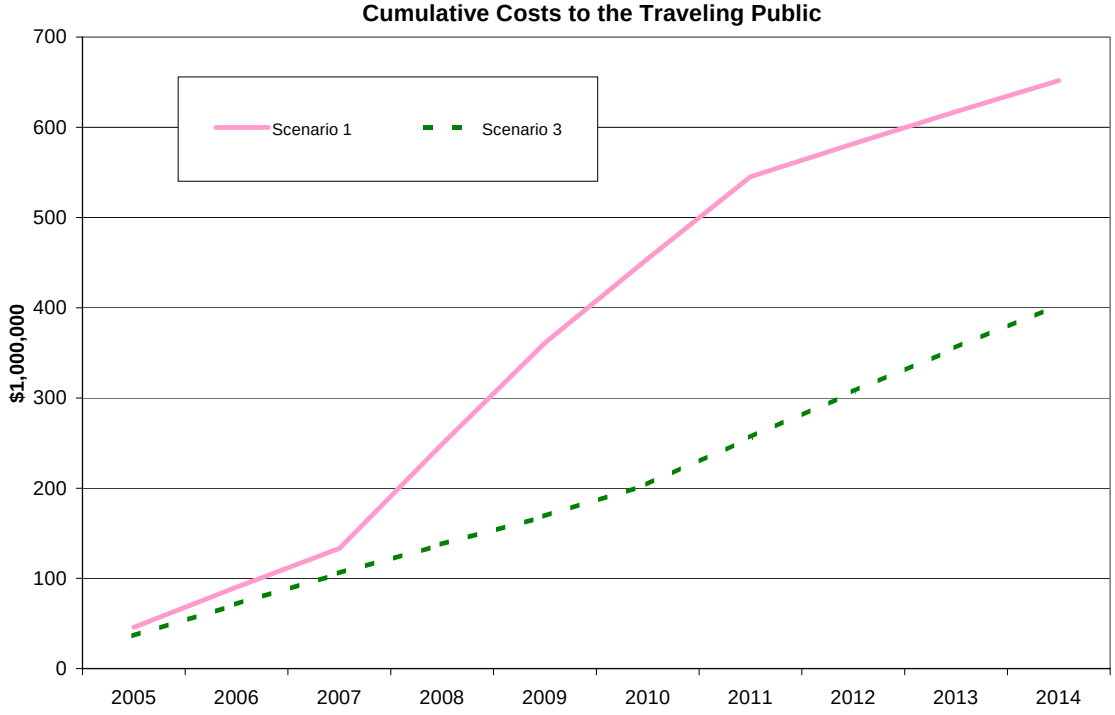
5.2.2 Costs to the Traveling Public

Costs to the traveling public differ significantly under these scenarios. Scenarios 1 and 3 have the following cumulative costs to the traveling public (see Figure 5-13):

- Scenario 1
  - $652 million (10-year total)
- Scenario 3
  - $403 million (10-year total)

The main difference between these scenarios is that the cumulative cost of Scenario 1 to the traveling public is about $249 million more than that of Scenario 3 for the evening peak period. The total difference in costs to the traveling public would nearly double, to about $498 million with Scenario 1, if the morning peak period costs were considered. For further figures comparing travel costs on an individual basis under Scenarios 1 and 3, see Attachment 6, Additional Comparison Figures.

Figure 5-13 Scenarios 1 and 3
Cumulative Costs to the Traveling Public

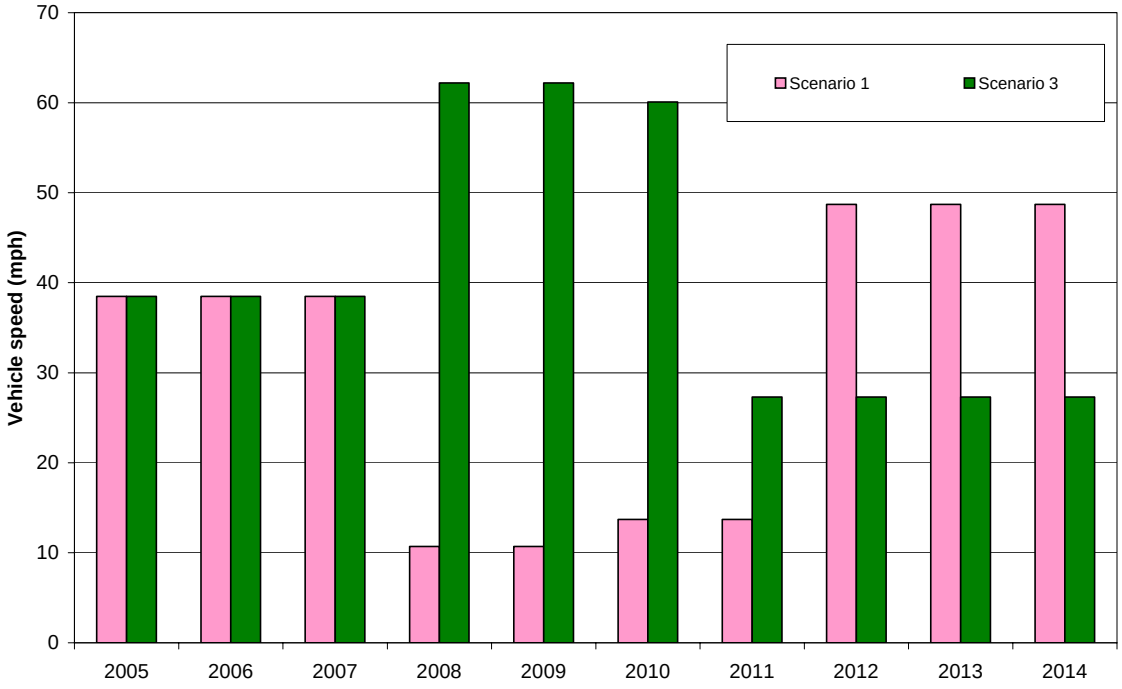


5.2.3 Average Speeds and Travel Times

Speeds and travel times are components of the calculation of costs to the traveling public. Travel times are much higher and travel speeds are much lower with Scenario 1 compared to Scenario 3. The following compares Scenarios 1 and 3 with respect to average speeds on I-15 in the North Corridor (see Figure 5-14):

- Scenario 1
  - Average speed, 39 mph from 2005 to 2008
  - Average speed, 12 mph from 2008 to 2012
  - Average speed, 49 mph from 2012 to 2015
- Scenario 3
  - Average speed, 39 mph from 2005 to 2008
  - Average speed, 62 mph from 2008 to 2011
  - Average speed, 27 mph from 2011 to 2015

Figure 5-14 Scenarios 1 and 3
Travel Speeds on I-15 Between US 89 and I-215 Interchange



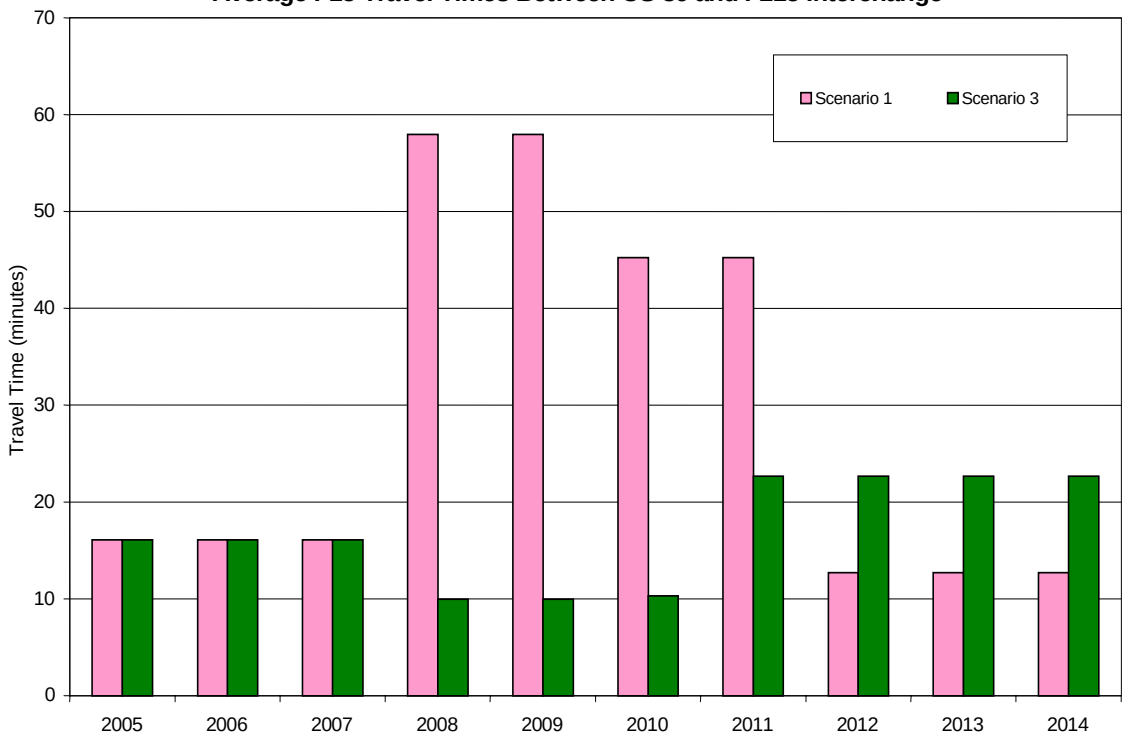
The main difference between these scenarios is that average speeds on I-15 are 50 mph faster under Scenario 3 than under Scenario 1 from 2008 to 2010 and 46 mph faster in 2011. This is because Maximum Future Transit does not provide

the same level of congestion relief on I-15 as Legacy Parkway when I-15 is being reconstructed.

The following compares Scenarios 1 and 3 with respect to average travel times on I-15 in the North Corridor (see Figure 5-15):

- Scenario 1
  - Average travel time, 16 minutes from 2005 to 2008
  - Average travel time, 58 minutes from 2008 to 2009
  - Average travel time, 45 minutes from 2010 to 2011
  - Average travel time, 13 minutes from 2011 to 2015
- Scenario 3
  - Average travel time, 16 minutes from 2005 to 2008
  - Average travel time, 10 minutes from 2008 to 2011
  - Average travel time, 23 minutes from 2011 to 2015

Figure 5-15 Scenarios 1 and 3
Average I-15 Travel Times Between US 89 and I-215 Interchange



The main difference between these scenarios is that average travel times on I-15 range from 35 to more than 45 minutes slower in the evening peak hour under Scenario 1 than under Scenario 3 from 2008 to 2011. For further figures showing

individual travel times for Legacy Parkway, I-15, and Maximum Future Transit, see Attachment 6, Additional Comparison Figures.

Under Scenario 1, travel speed increases slightly in 2010 and 2011 over speeds in 2008 and 2009, and the corresponding travel times in 2010 and 2011 decrease from times in 2008 and 2009. There is no obvious reason why this should happen, since under this scenario demand increases in 2010 and 2011 but capacity in the North Corridor does not. Increased demand without a corresponding increase in capacity should result in lower travel speeds and increased travel times.

This anomaly is explained by some combination of the following three factors:

- Between 2007 and 2012, changes to the background roadway network (outside the corridor)—specifically US 89 in north Davis County, 200 North in Kaysville, and several cross streets in Layton—would improve the transportation system enough that traffic would increase slightly on non-freeway streets. Improvements would also cause traffic to decrease slightly on I-15 between 2007 and 2012 due to improved transportation system capacity (outside the corridor).
- The analysis assumed that transit improvements between 2007 and 2012, even without Maximum Future Transit, were based on increasing transit service coverage in the corridor and implementing Phase I of the WFRC LRP outside the corridor, including the Mid-Jordan and West Valley light rail transit lines. Adding this transit service outside the corridor would decrease freeway trips and increase freeway speeds inside the corridor.
- Speeds are very unstable at LOS F, the expected operating condition between 2005 and 2012 under Scenario 1. Although the travel model iterates volumes and speeds until it reaches equilibrium, the instability of speeds and volumes at such poor operating conditions in the corridor, especially those existing during the reconstruction of I-15, current models might not be able to accurately predict these speeds and volumes. However, even though the travel model may not accurately predict the changes in actual speeds, it is believed to provide a reasonable ranking of the relative order of alternatives even under these conditions.

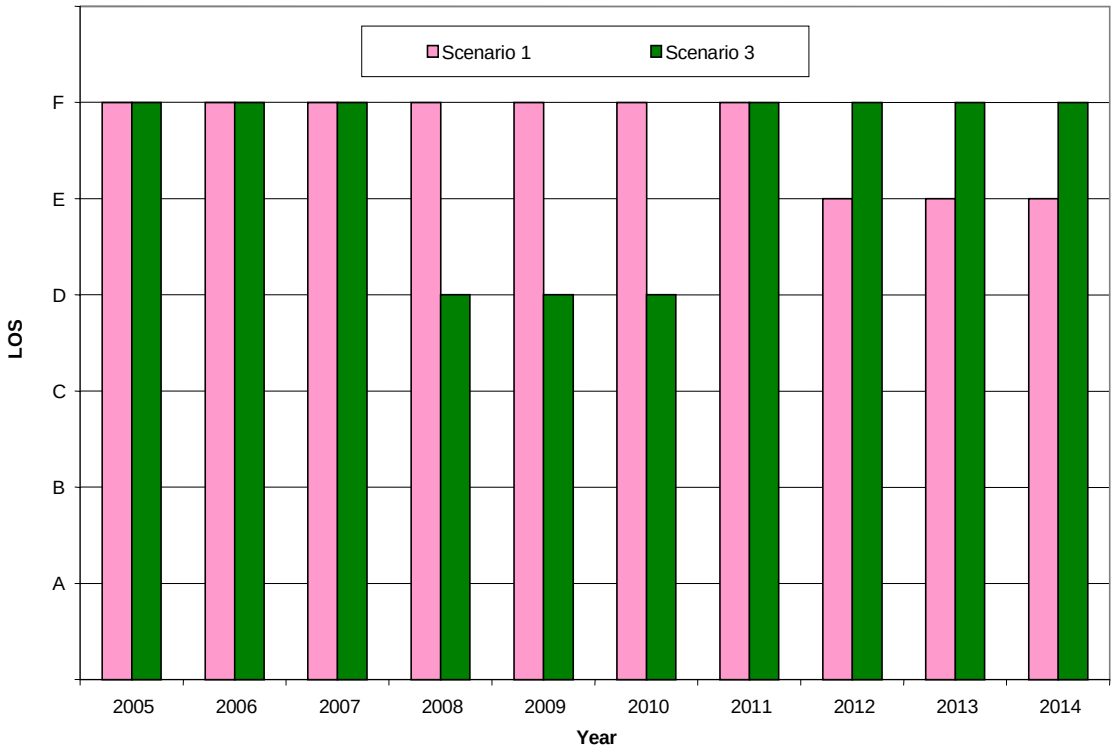
5.2.4 Level of Service

The following compares the level of service on I-15 under Scenarios 1 and 3 (see Figure 5-16):

- Scenario 1
  - LOS F from 2005 to 2008
  - LOS F from 2008 to 2012
  - LOS E from 2012 to 2015
- Scenario 3
  - LOS F from 2005 to 2008
  - LOS D from 2008 to 2011
  - LOS F from 2011 to 2015

The main difference between these scenarios is that I-15 operates at LOS F under Scenario 1 but at LOS D under Scenario 3 from 2008 to 2011. Conversely, Scenario 1 operates at LOS E after I-15 has been reconstructed while Scenario 3 operates at LOS F while I-15 is being reconstructed. For the level of service on the Legacy Parkway, see Attachment 6, Additional Comparison Figures.

Figure 5-16 Scenarios 1 and 3
I-15 Level of Service



5.2.5 Capacity Compared to Demand

The following compares the capacities of Scenarios 1 and 3 to the travel demand for the years 2005 to 2020 (see Figure 5-17):

- Scenario 1
  - Capacity fails to meet demand from 2005 to 2012.
  - Capacity meets demand from 2012 to 2020.
- Scenario 3
  - Capacity fails to meet demand from 2005 to 2008.
  - Capacity meets demand from 2008 to 2011.
  - Capacity fails to meet demand from 2011 to 2015.
  - Capacity meets demand from 2015 to 2020.

The main difference between these scenarios is that from 2008 to 2012 the capacity of Scenario 1 is substantially less than projected travel demand while Scenario 3 meets that demand. Another difference, though less severe, is that from 2011 to 2015 the capacity of Scenario 3 is below demand while Scenario 1 meets demand from 2012 to 2015.

Figure 5-17 Scenarios 1 and 3
Available Capacity Compared to Estimated Demand

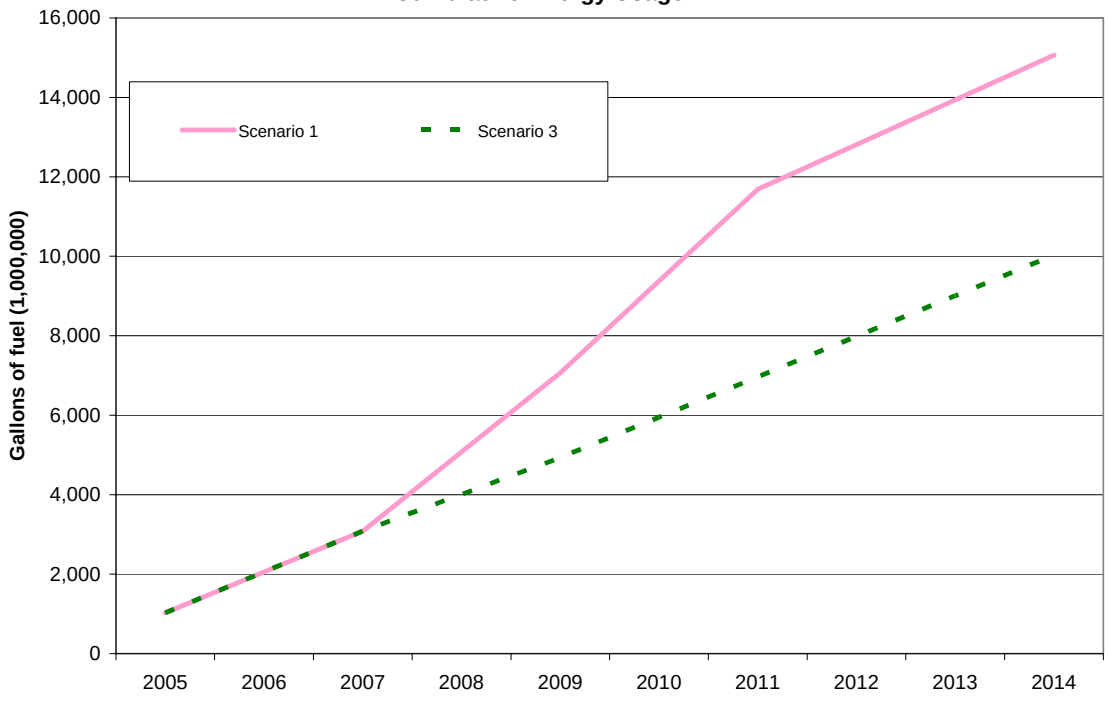
5.2.6 Energy Usage

The following compares the cumulative consumption of energy under Scenarios 1 and 3 (see Figure 5-18):

- Scenario 1
  - 15.1 billion gallons of fuel consumed (10-year total)
- Scenario 3
  - 10.0 billion gallons of fuel consumed (10-year total)

Scenario 1 uses 50% more energy than Scenario 3 (about 5.1 billion gallons) over the study period. This difference is associated with the increase in congestion on I-15 that would occur with Scenario 1 compared to Scenario 3 plus the increase in congestion on arterials and connector roads from the diversion of traffic from I-15 onto these roads. Figure 5-18 reflects the energy used by the two scenarios for the evening peak period. The total difference in energy used during the analysis period would nearly double if difference in energy consumed in the morning peak period were included.

Figure 5-18 Scenarios 1 and 3
Cumulative Energy Usage



5.2.7 Air Emissions

The following compares the annual generation of air pollutants (total emissions of VOCs, CO, NO_x, and PM_{10}) under Scenarios 1 and 3 (see Figure 5-19):

- Scenario 1
  - 3,480 tons per year from 2005 to 2007
  - 5,330 tons per year from 2008 to 2009
  - 5,510 tons per year from 2010 to 2011
  - 3,570 tons per year from 2012 to 2015
- Scenario 3
  - 3,480 tons per year from 2005 to 2007
  - 3,780 tons per year from 2008 to 2009
  - 3,900 tons per year in 2010
  - 3,640 tons per year from 2011 to 2015

Figure 5-19 Scenarios 1 and 3
Peak Period Air Emissions

Air emissions are higher under Scenario 1 than under Scenario 3 from 2008 to 2012. While this numeric difference is substantial—about 1,650 tons—it is not substantial with respect to conformity because the Shared Solution would meet regional air quality regulations. Therefore, this difference is not an issue of compliance. As with energy use, the higher air emissions from 2008 to 2012 are

due to the greater congestion that would occur on I-15 and on arterials and connector roads with Scenario 1 compared to Scenario 3. Calculations of air emissions in this analysis include only those from sources associated with the three major components of the Shared Solution plus arterials and connectors. A balance of emissions to the airshed over the study area was not calculated.

As with energy usage, air emissions reflect those pollutants emitted during the evening peak period. The total difference in emissions between the scenarios for the study period would nearly double if the difference in emissions in the morning peak period were included. For the individual pollutant emission results, see Attachment 6, Additional Comparison Figures.

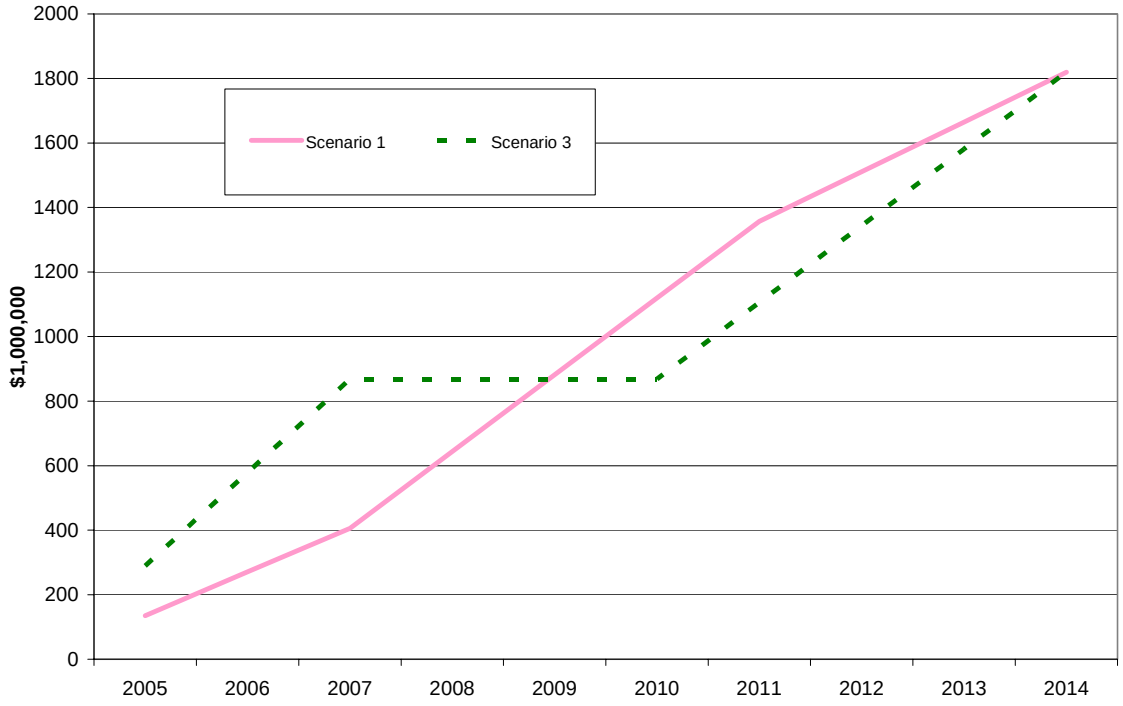
5.2.8 Construction Costs

The following compares the total cumulative construction costs for the Shared Solution under Scenarios 1 and 3 from 2005 to 2015 (see Figure 5-20):

- Scenario 1
  - $135 million per year from 2005 to 2008
  - $238 million per year from 2008 to 2012
  - $142 million per year from 2011 to 2015
- Scenario 3
  - $277 million per year from 2005 to 2008
  - $0 from 2008 to 2011
  - $238 million per year from 2011 to 2015

The main difference between these scenarios is that Scenario 3 has the largest upfront costs because Maximum Future Transit and the Legacy Parkway would be under construction at the same time. If the rate of inflation is higher than state revenues, Scenario 3 could be a better investment strategy.

Figure 5-20 Scenarios 1 and 3
Cumulative Construction Costs

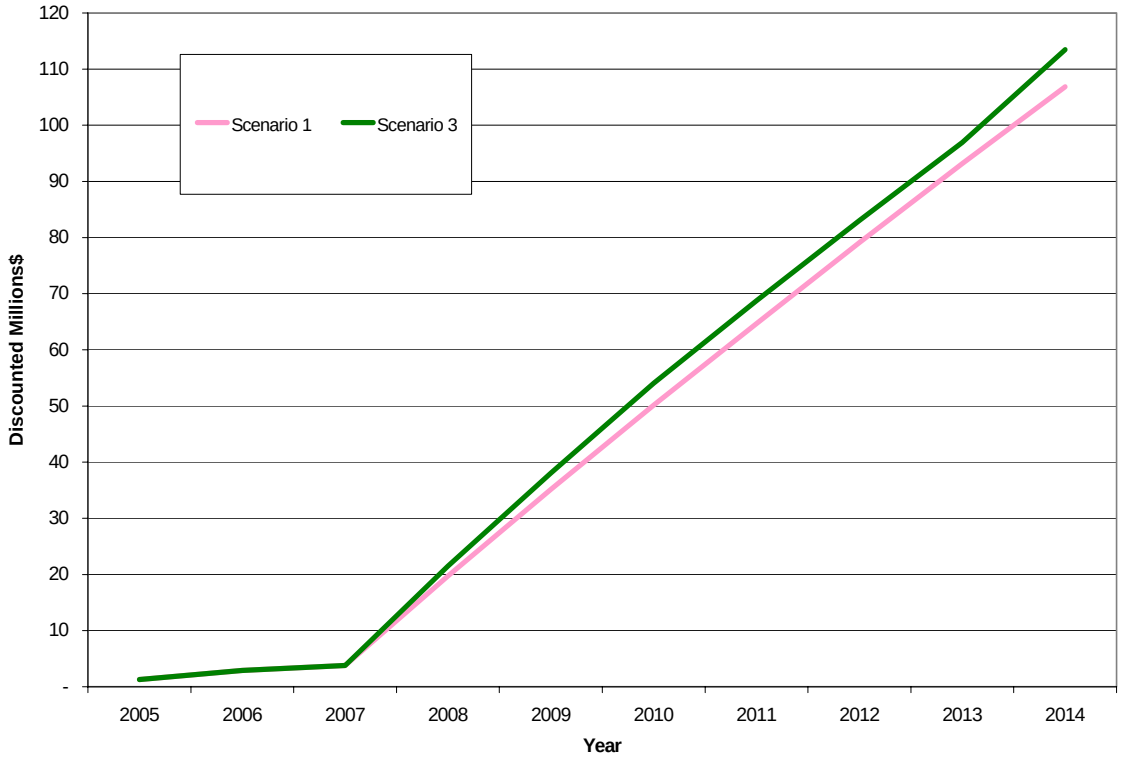


5.2.9 Operating and Maintenance Costs

The following compares the cumulative O&M costs under Scenarios 1 and 3 from 2005 to 2015 (see Figure 5-21):

- Scenario 1
  - $1 million per year from 2005 to 2008
  - $17 million per year from 2008 to 2011
  - $18 million per year from 2011 to 2015
- Scenario 3
  - $1 million per year from 2005 to 2008
  - $19 million per year from 2008 to 2011
  - $18 million per year from 2011 to 2014
  - $22 million per year from 2014 to 2015

Figure 5-21 Scenarios 1 and 3
Cummulative Operating & Maintenance Costs



There is no major O&M cost difference between these scenarios. The cumulative O&M costs for these scenarios differ by only about $7 million out of a total O&M cost of $113 million (6%). The $7 million difference is the minor

additional O&M cost of maintaining the Legacy Parkway for 3 more years under Scenario 3 compared to Scenario 1.

5.2.10 Comparison Summary of Scenarios 1 and 3

To summarize the comparison of Scenarios 1 and 3, the variables with the greatest difference in effects are delayed impacts to wetlands and the increased costs to the traveling public, which is also reflected in increased travel times and decreased travel speeds.

Scenario 1 would result in a 7-year delay in the 113 acres of wetland impacts caused by the Legacy Parkway. However, 14 acres of wetland impacts would occur with the reconstruction of I-15 beginning in 2008, so a net 99 acres of wetland impacts would be delayed for 7 years.

Delaying the impacts of the Legacy Parkway could cause the loss of the benefits from preserving, restoring, and enhancing wetlands that would occur with the Legacy Nature Preserve. The loss of these benefits has two components: (1) the benefits of preserving, restoring, and enhancing the wetlands in the Nature Preserve would be delayed for 7 years, and (2) the benefits could be lost or diminished permanently. For instance, in the event of a protracted legal case or Section 404 decision process, the Corps could require the original wetlands to be restored. As a result, the Nature Preserve would no longer be needed as mitigation and the benefits from the Nature Preserve would be lost.

All of the wetlands in the study area are assumed to still be jurisdictional wetlands, specifically groundwater slope, basin depressional, and lacustrine fringe wetlands. These wetlands are used by fish and wildlife, provide flood storage and improve water quality. More information on the wetlands in the study area can be found in Section 3.12 of the Final EIS.

Recognizing the potential inaccuracies described in Section 5.2.3 above, the tradeoff for delaying impacts to a net 99 acres of wetlands under Scenario 1 compared to Scenario 3 would be the cost to the traveling public of about $250 million +/- for the evening peak period (and nearly $500 million total +/- for both the morning and evening peak periods).

5.3 Comparison of Scenarios 2 and 3

The comparison of Scenarios 2 and 3 evaluates the tradeoffs of delaying construction of Legacy Parkway until Maximum Future Transit is in place and operating. As indicated in Section 3.3, Objective of This Analysis, the reason this comparison is being made is to determine if constructing Maximum Future Transit before constructing Legacy Parkway is a practicable alternative.

Scenario 2 follows a build sequence of Maximum Future Transit first, Legacy Parkway second, and reconstruction of I-15 third. Scenario 3 calls for the simultaneous building of Maximum Future Transit and Legacy Parkway followed by reconstruction of I-15.

5.3.1 Wetlands

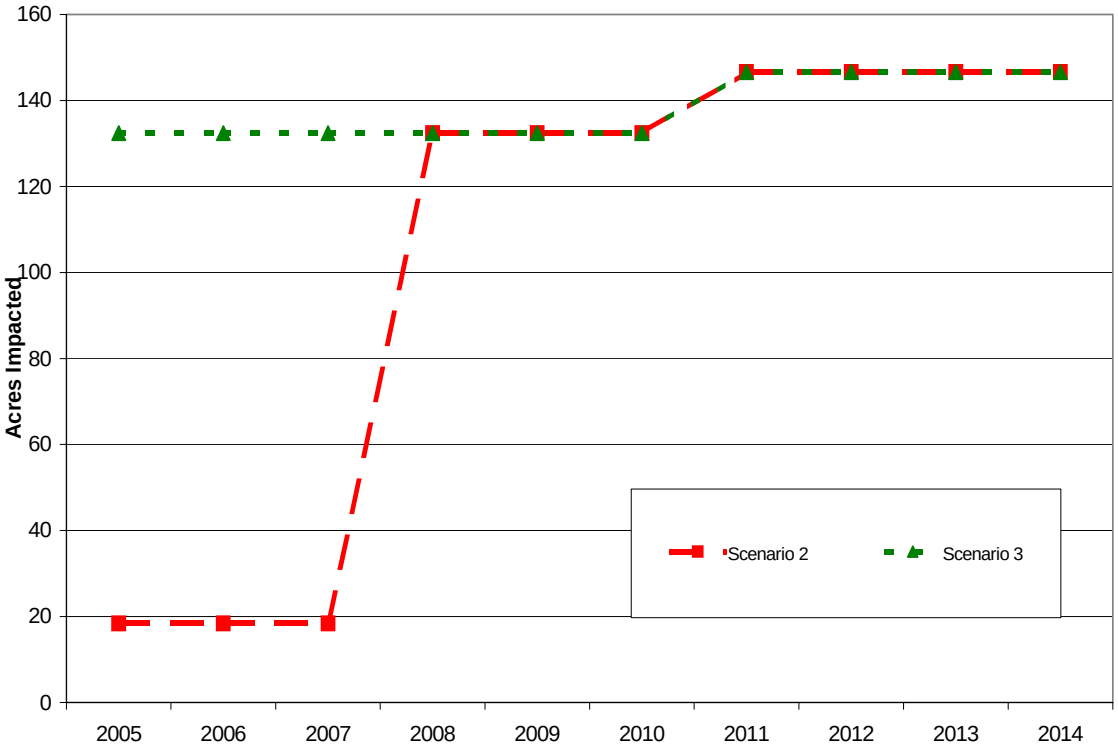
Scenarios 2 and 3 have the following impacts to wetlands (see Figure 5-22):

- Scenario 2
  - 18 acres (Maximum Future Transit) in 2005
  - 113 acres more (Legacy Parkway) in 2008
  - 15 acres more (I-15) in 2011
- Scenario 3
  - 131 acres (Maximum Future Transit and Legacy Parkway) in 2005
  - 15 acres more (I-15) in 2011
- Net delays in wetland impacts under Scenario 2
  - 113 acres from 2005 to 2008

The major difference between these scenarios is that Scenario 2 delays direct impacts to 113 acres for 3 years, 2005 to 2008, compared to Scenario 3.

Delaying the impacts of the Legacy Parkway would result in certain benefits (preserving 113 acres of wetlands for 3 years) as well as the loss of the benefits from preserving and restoring other wetlands in the Legacy Nature Preserve. The loss of these benefits has two components: (1) the benefits of preserving, restoring, and enhancing the wetlands in the Nature Preserve would be delayed for 3 years, and (2) the benefits could be lost or diminished permanently. During the 3-year delay of the Legacy Parkway, the mitigation decision could change. For instance, in the event of a protracted legal case or Section 404 decision process, the Corps could require the original wetlands to be restored. As a result, the Nature Preserve would no longer be needed as mitigation and the benefits from the Nature Preserve would be lost.

Figure 5-22 Scenarios 2 and 3
Wetlands Impacts



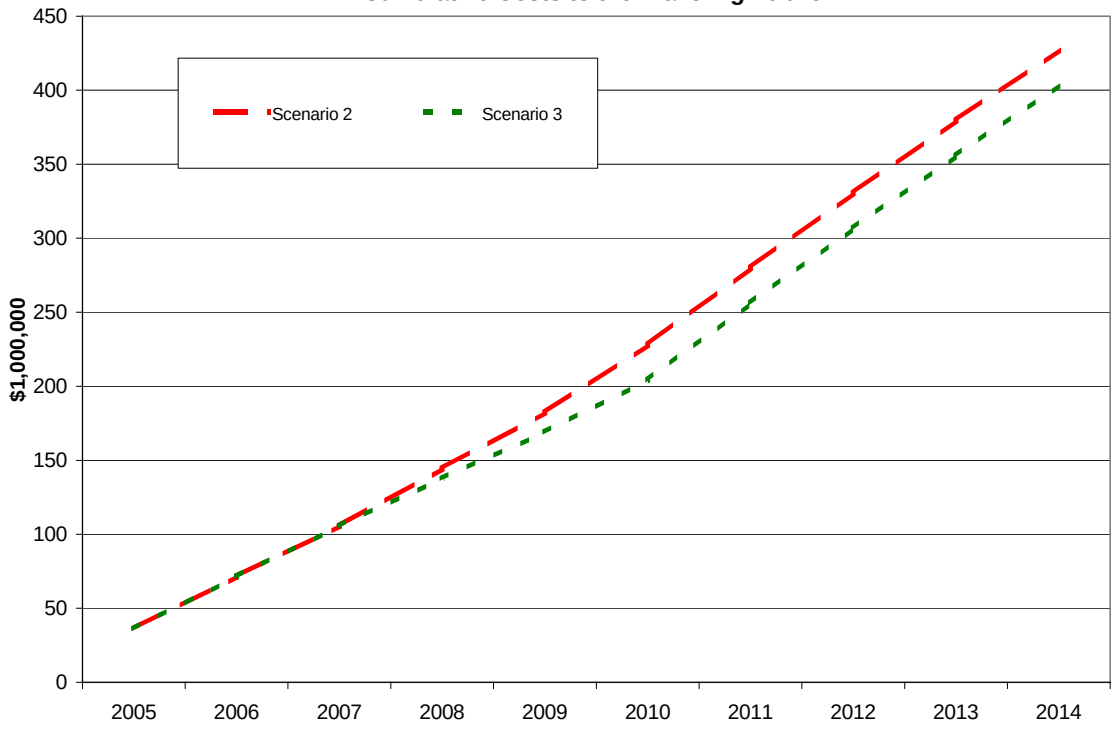
5.3.2 Costs to the Traveling Public

Scenarios 2 and 3 have the following cumulative costs to the traveling public (see Figure 5-23):

- Scenario 2
  - $427 million (10-year total)
- Scenario 3
  - $403 million (10-year total)

The cumulative costs of Scenarios 2 and 3 differ by $24 million out of a total cost of more than $400 million (6%) over the 10-year study period. The difference between the scenarios in costs to the traveling public is for the afternoon peak period commute. The total difference in costs would be nearly double if the morning peak period commute costs were included. For further comparison of costs to the traveling public, see Attachment 6, Additional Comparison Figures.

Figure 5-23 Scenarios 2 and 3
Cumulative Costs to the Traveling Public



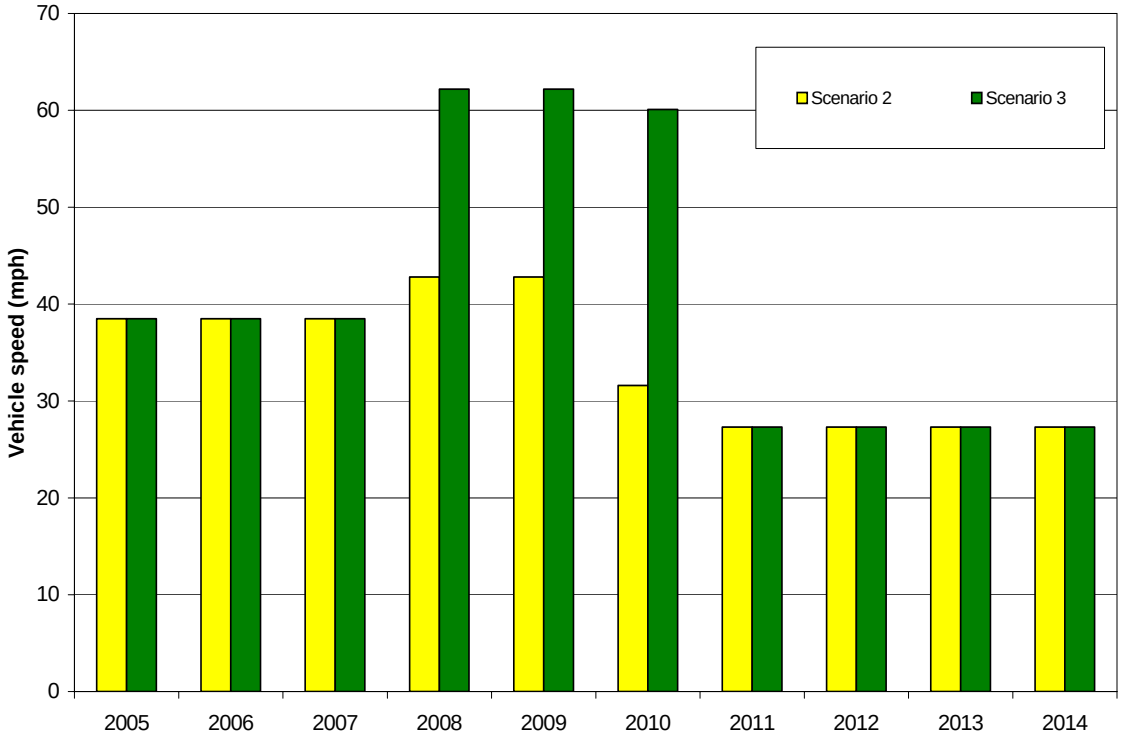
5.3.3 Average Speeds and Travel Times

Average speeds and travel times are related to the costs incurred by the traveling public. The following compares Scenarios 2 and 3 with respect to average speeds on I-15 between the I-15 and I-215 interchange (on the south) and US 89 (on the north) during the afternoon peak period (see Figures 5-24 and 5-25):

- Scenario 2
  - Average speed, 39 mph from 2005 to 2008
  - Average speed, 43 mph from 2008 to 2009
  - Average speed, 32 mph in 2010
  - Average speed, 27 mph from 2011 to 2015
- Scenario 3
  - Average speed, 39 mph from 2005 to 2008
  - Average speed, 62 mph from 2008 to 2011
  - Average speed, 27 mph from 2011 to 2015

The major difference between these scenarios is that average speeds on I-15 are over 19 mph faster under Scenario 3 than under Scenario 2 in the years 2008 and 2009 and 29 mph faster in 2010.

Figure 5-24 Scenarios 2 and 3
Travel Speeds on I-15 Between US 89 and I-215 Interchange

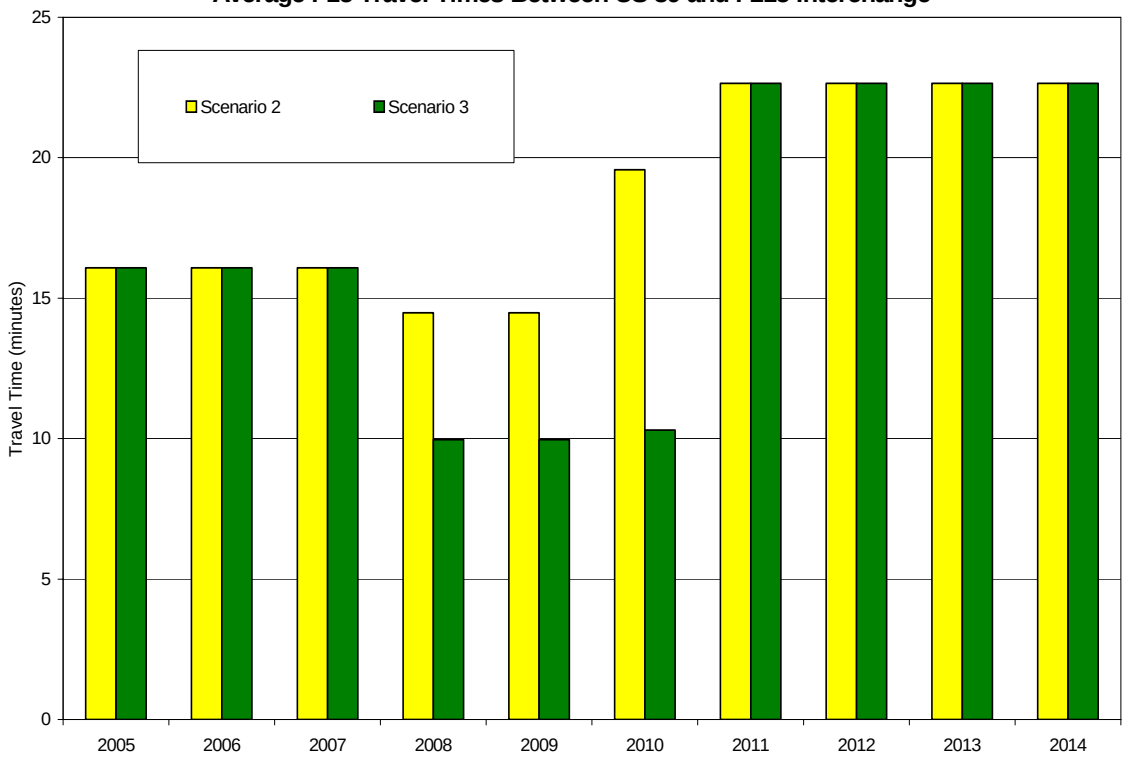


The following compares Scenarios 2 and 3 with respect to average travel times on I-15 between the I-15 and I-215 interchange (on the south) and US 89 (on the north) during the afternoon peak period (see Figure 5-25):

- Scenario 2
  - Average travel time, 16 minutes from 2005 to 2008
  - Average travel time, 15 minutes from 2008 to 2009
  - Average travel time, 20 minutes in 2010
  - Average travel time, 23 minutes from 2011 to 2015
- Scenario 3
  - Average travel time, 16 minutes from 2005 to 2008
  - Average travel time, 10 minutes from 2008 to 2011
  - Average travel time, 23 minutes from 2011 to 2015

The major difference between these scenarios is that travel times on I-15 are about 5 minutes slower in 2008 and 2009 and 10 minutes slower in 2010 under Scenario 2 than under Scenario 3. For the individual travel times on I-15, Legacy Parkway, and Maximum Future Transit, see Attachment 6, Additional Comparison Figures.

Figure 5-25 Scenarios 2 and 3
Average I-15 Travel Times Between US 89 and I-215 Interchange



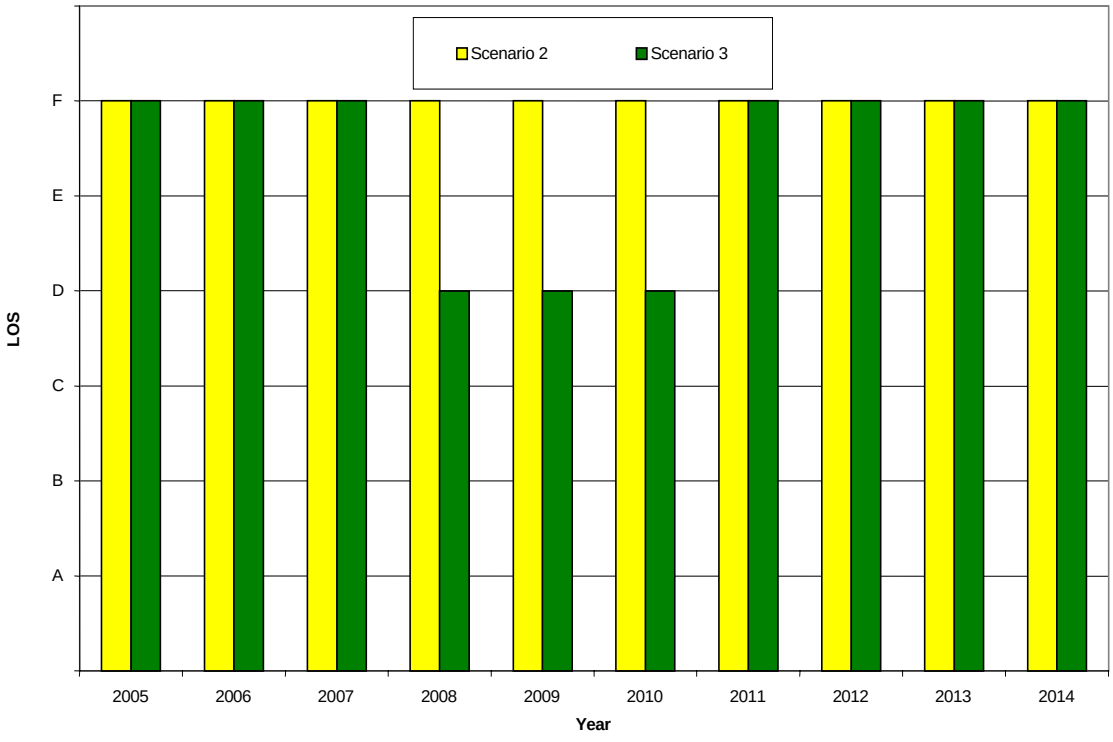
5.3.4 Level of Service

The following compares the level of service on I-15 under Scenarios 2 and 3 (see Figure 5-26):

- Scenario 2
  - LOS F from 2005 to 2008
  - LOS F from 2008 to 2011
  - LOS F from 2011 to 2015
- Scenario 3
  - LOS F from 2005 to 2008
  - LOS D from 2008 to 2011
  - LOS F from 2011 to 2015

The main difference between these scenarios is that I-15 operates at LOS F under Scenario 2 and at LOS D under Scenario 3 from 2008 to 2011. This is because Maximum Future Transit does not meet enough demand to prevent I-15 from operating at LOS F during construction of Legacy Parkway. For the level of service of operation on Legacy Parkway under Scenarios 2 and 3, see Attachment 6, Additional Comparison Figures.

Figure 5-26 Scenarios 2 and 3
I-15 Level of Service



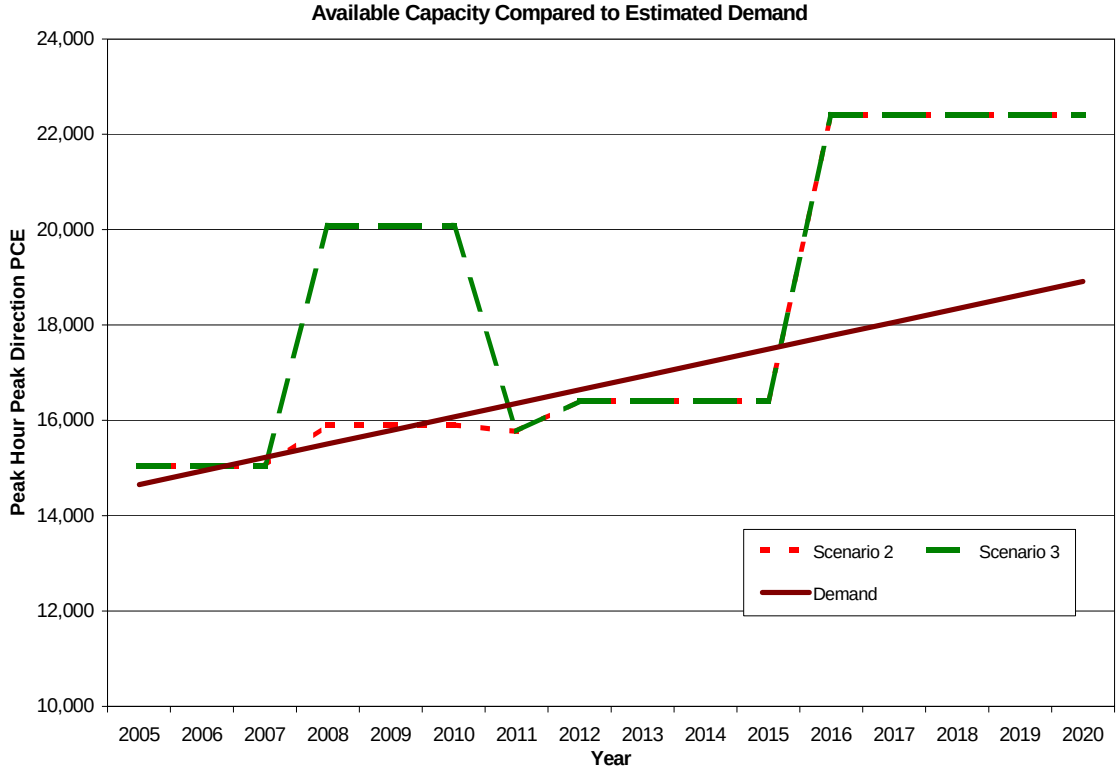
5.3.5 Capacity Compared to Demand

The following compares the capacities of Scenarios 2 and 3 to the travel demand for the years 2005 to 2020 (see Figure 5-27):

- Scenario 2
  - Capacity fails to meet demand from 2005 to 2015.
  - Capacity meets demand from 2015 to 2020.
- Scenario 3
  - Capacity fails to meet demand from 2005 to 2008.
  - Capacity meets demand from 2008 to 2011.
  - Capacity fails to meet demand from 2011 to 2015.
  - Capacity meets demand from 2015 to 2020.

The main difference between these scenarios is that Scenario 2 just barely fails to meet demand from 2008 to 2011 while Scenario 3 meets demand during that time. This is because Maximum Future Transit does not provide sufficient capacity to meet demand during construction of Legacy Parkway.

Figure 5-27 Scenarios 2 and 3
Available Capacity Compared to Estimated Demand



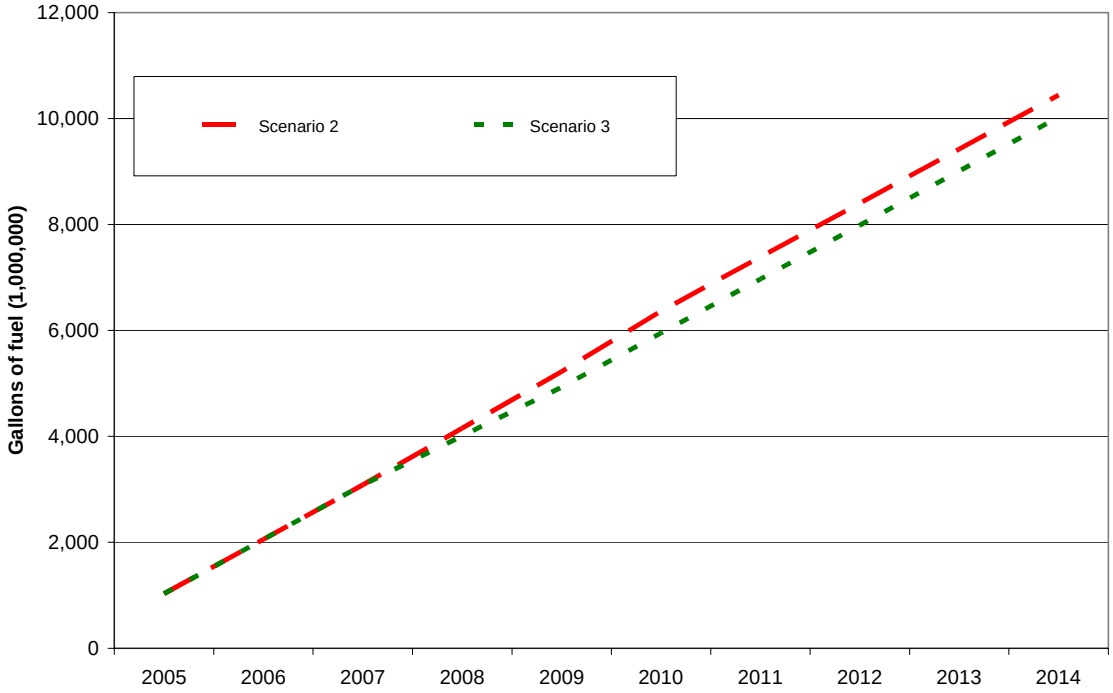
5.3.6 Energy Usage

The following compares the cumulative consumption of energy under Scenarios 2 and 3 (see Figure 5-28):

- Scenario 2
  - 10.4 billion gallons of fuel consumed (10-year total)
- Scenario 3
  - 10.0 billion gallons of fuel consumed (10-year total)

Scenario 2 uses slightly more fuel, about 4 million gallons, than Scenario 3. This is because of the increased congestion on I-15 plus the increased congestion on arterials and connector roads due to the diversion of traffic from I-15 to these roads. Figure 5-28 reflects energy use for the evening peak period. The total difference in energy used during the analysis period would nearly double if the difference in energy consumed in the morning peak period were included.

Figure 5-28 Scenarios 2 and 3
Cumulative Energy Usage



5.3.7 Air Emissions

The following compares the annual generation of air pollutants (total emissions of VOCs, CO, NO_x, and PM_{10}) under Scenarios 2 and 3 (see Figure 5-29):

- Scenario 2
  - 3,480 tons per year from 2005 to 2008
  - 3,340 tons per year from 2008 to 2009
  - 3,910 tons per year in 2010
  - 3,640 tons per year from 2011 to 2015
- Scenario 3
  - 3,480 tons per year from 2005 to 2008
  - 3,780 tons per year from 2008 to 2009
  - 3,900 tons per year in 2010
  - 3,640 tons per year from 2011 to 2015

There is little difference between the scenarios in terms of air emissions. Scenario 3 would have about 440 tons more emissions, out of a total of 3,780 tons, than Scenario 2 in 2008 and 2009. The slightly higher air emissions are due to the ability to travel at faster speeds on I-15 and the earlier construction of Legacy Parkway. In all other years, emission levels are similar.

Figure 5-29 Scenarios 2 and 3
Peak Period Air Emissions

Calculations of air emissions in this analysis include only those from sources associated with the major components of the Shared Solution plus arterials and connectors. A balance of emissions to the airshed over the study area was not calculated.

As with energy usage, air emissions reflect those pollutants emitted during the evening peak period. The total difference in emissions between the two scenarios would nearly double if the difference in emissions during the morning peak period were included. For the individual pollutant emission results, see Attachment 6, Additional Comparison Figures.

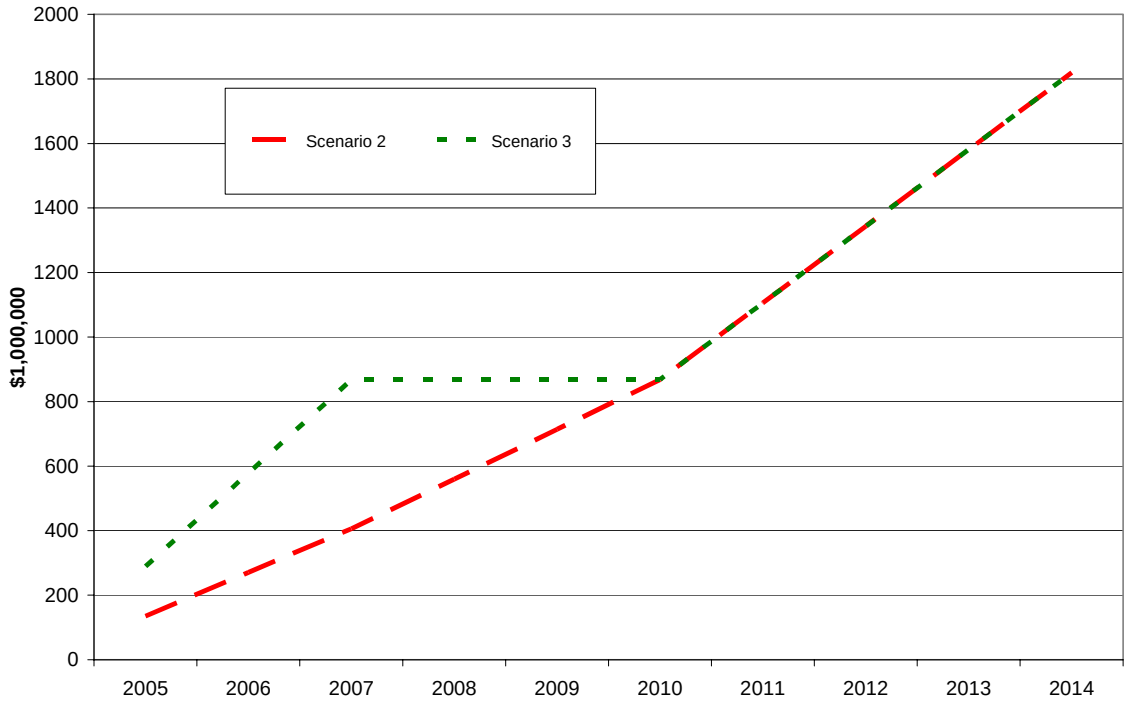
5.3.8 Construction Costs

The following compares the total cumulative construction costs for the Shared Solution under Scenarios 2 and 3 from 2005 to 2015 (see Figure 5-30):

- Scenario 2
  - $135 million per year from 2005 to 2008
  - $142 million per year from 2008 to 2011
  - $238 million per year from 2011 to 2015
- Scenario 3
  - $277 million per year from 2005 to 2008
  - $0 from 2008 to 2011
  - $238 million per year from 2011 to 2015

The main difference between these scenarios is that Scenario 3 has greater upfront construction costs than Scenario 2. The reason is that Maximum Future Transit and Legacy Parkway are under construction at the same time. If the rate of inflation is higher than state revenues, Scenario 3 could be a better investment strategy.

Figure 5-30 Scenarios 2 and 3
Cumulative Construction Costs

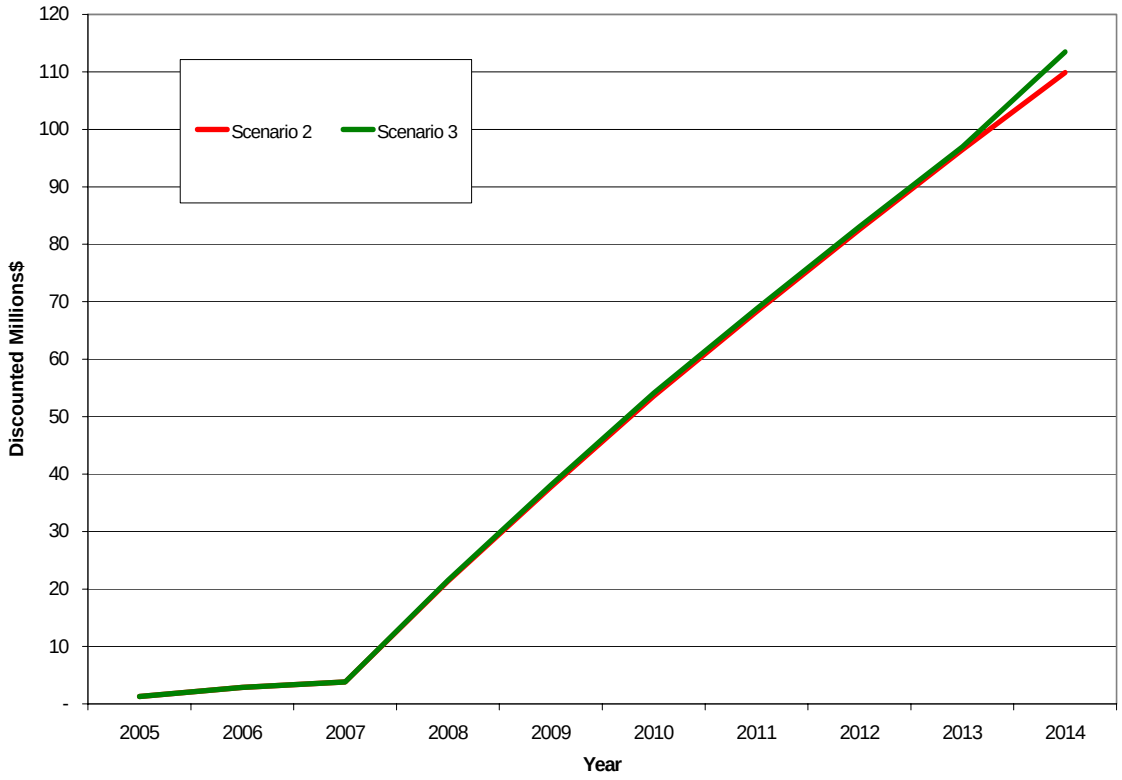


5.3.9 Operating and Maintenance Costs

The following compares the cumulative O&M costs under Scenarios 2 and 3 from 2005 to 2015 (see Figure 5-31):

- Scenario 2
  - $1 million per year from 2005 to 2008
  - $19.5 million per year from 2008 to 2011
  - $18 million per year from 2011 to 2015
- Scenario 3
  - $1 million per year from 2005 to 2008
  - $19 million per year from 2008 to 2011
  - $18 million per year from 2011 to 2015

Figure 5-31 Scenarios 2 and 3
Cummulative Operating & Maintenance Costs



There is no major difference in O&M costs between these scenarios. The primary component of O&M costs is Maximum Future Transit, which is the first project under each scenario. The minor difference in O&M costs between the scenarios, about $3.6 million out of a total cost of about $113 million over 10 years (3%), is

the added cost of operating and maintaining Legacy Parkway for more years under Scenario 3.

5.3.10 Comparison Summary of Scenarios 2 and 3

In summary, Scenarios 2 and 3 were compared to help determine whether delaying the impacts to wetlands and increasing costs to the traveling public is a practicable alternative.

Recognizing the potential inaccuracies described in Section 5.2.3 above, Scenario 2 would delay impacts to 113 acres of wetlands for 3 years compared to Scenario 3 but at an additional cost to the traveling public of $24 million +/- during the afternoon peak period. Including the morning peak period would increase the extra cost to the traveling public to nearly $48 million +/-. Scenario 3 would also have better travel times, travel speeds, and level of service from 2008 to 2011.

All of the wetlands in the study area are assumed to still be jurisdictional wetlands, specifically groundwater slope, basin depressional, and lacustrine fringe wetlands. These wetlands are used by fish and wildlife, provide flood storage and improve water quality. More information on the wetlands in the study area can be found in Section 3.12 of the Final EIS.

Delaying the impacts of the Legacy Parkway would result in certain benefits (preserving 113 acres of wetlands for 3 years) as well as the loss of benefits from preserving and restoring other wetlands in the Legacy Nature Preserve. The loss of these benefits has two components: (1) the benefits of preserving, restoring, and enhancing the wetlands in the Nature Preserve would be delayed for 3 years, and (2) the benefits could be lost or diminished permanently. For instance, in the event of a protracted legal case or Section 404 decision process, the Corps could require the original wetlands to be restored. As a result, the Nature Preserve would no longer be needed as mitigation and the benefits from the Nature Preserve would be lost.

6.0 Conclusions

This sequencing analysis provides information on the consequences of constructing the Legacy Parkway, reconstructing I-15, and constructing Maximum Reasonable Future Transit at different times. This is done to help answer two questions:

- Whether the conclusion of the Final EIS—that reconstructing I-15 before constructing Legacy Parkway is not a practicable alternative—is still valid
- Whether constructing Maximum Future Transit before Legacy Parkway is a practicable alternative

The comparisons of scenarios are designed to help answer these two questions. The first comparison, between Scenarios 3 and 4, shows that the two scenarios have essentially the same environmental impacts. Therefore, only Scenario 3 was used for comparison with the other possible construction sequences.

The second comparison, between Scenarios 1 and 3, helps reevaluate the decision in the Final EIS that reconstructing I-15 before constructing the Legacy Parkway is not a practicable under Section 404. The major differences between these two scenarios are as follows:

- Compared to Scenario 3, Scenario 1:
  - Delays impacts to 113 acres of wetlands for 7 years.
  - Provides a safer and less stressful commute through the North Corridor by improving the level of service on I-15 from LOS F to LOS E for the 3-year period from 2012 to 2015, before the completion of the Legacy Parkway.
- Compared to Scenario 1, Scenario 3:
  - Lowers costs to the traveling public by $250 million +/- during the afternoon peak period (and by nearly $500 million +/- for travel during both the morning and evening peak periods).
  - Provides faster travel speeds through the North Corridor by about 50 mph +/- for the 4-year period from 2008 to 2012 during the reconstruction of I-15.
  - Reduces travel times through the North Corridor by about 35 minutes +/- for the 4-year period from 2008 to 2012 during the reconstruction of I-15.

- Provides a safer and less stressful commute through the North Corridor by improving the level of service from LOS F to LOS D for the 3-year period from 2008 to 2011 during the reconstruction of I-15. As congestion increases, so does the potential for accidents. Scenario 3 reduces the potential for accidents by reducing congestion by two levels of service over Scenario 1.
- Reduces energy use by 50%, or about 5 billion gallons.
- Reduces air emissions by about 1,650 tons per year from 2008 to 2012.
- Ensures that mitigation for the Legacy Parkway (to preserve and restore about 2,100 acres of land to be included in the Legacy Nature Preserve) could be implemented.

The final comparison, between Scenarios 2 and 3, helps determine whether constructing Maximum Future Transit (with all assumptions) before the Legacy Parkway is a practicable alternative. The major differences between these two scenarios are as follows:

- Compared to Scenario 3, Scenario 2:
  - Delays impacts to 113 acres of wetlands for 3 years.
- Compared to Scenario 2, Scenario 3:
  - Lowers costs to the traveling public by $24 million +/- (and by about $48 million +/- if travel costs during the morning peak period were also included).
  - Provides faster travel speeds through the North Corridor by 25 mph +/- for the 3-year period from 2008 to 2011 with Legacy Parkway in place during the reconstruction of I-15.
  - Reduces travel times through the North Corridor by about 8 minutes +/- for the 3-year period from 2008 to 2011 with Legacy Parkway in place during the reconstruction of I-15.
  - Provides for a safer and less stressful commute through the North Corridor by improving the level of service from LOS F to LOS D for the 3-year period from 2008 to 2012 with Legacy Parkway in place during the reconstruction of I-15.
  - Reduces energy use by about 4 million gallons.
  - Ensures that mitigation for the Legacy Parkway (to preserve and restore about 2,100 acres of land to be included in the Legacy Nature Preserve) could be implemented.

Attachment 1: Legacy Parkway Sequencing Model Summary

Legacy Parkway Sequencing Modeling Summary

This attachment summarizes the travel demand modeling completed for the Legacy Parkway sequencing analysis, including the modeling that resulted in the tables that have been produced for the sequencing analysis. Appendix B to the Supplemental EIS also provides information about the Legacy Parkway modeling.

Scenarios (Not to be confused with NEPA Alternatives)

For the sequencing analysis, four broad scenarios were developed. Table A1-1 describes the sequences in each of these four scenarios. The purpose of the modeling of the sequences is to provide travel demand data for each scenario in support of the sequencing analysis. Other sections of the Supplemental EIS have derived the components of the Shared Solution and considered alternatives to the components of the Shared Solution. The sequencing analysis does not duplicate the alternatives analysis of the Supplemental EIS. It only considers the alternative construction sequencing of the major components of the Shared Solution, as modified with the use of Maximum Future Transit.

Table A1-1: Sequence Summary

	Scenario			
	1	2	3	4
I-15	**Second**	**Third**	**Third**	**Third**
Legacy	**Third**	**Second**	**First**	**First**
Maximum Transit	**First**	**First**	**First**	**Second**

These scenarios were developed based on earlier consultation with Federal Highways and UDOT and seem to exhaust the range of reasonable sequencing options (although there is a broader range of possible options). For each scenario, it was assumed that construction would begin as soon as 2005 and would require approximately three years to complete (the initial phase) of Maximum Reasonable Future Transit (Maximum Transit) (based on the timing of Commuter Rail) or Legacy Parkway and four years to complete the reconstruction of I-15.

Time Periods

Outputs of the modeling were travel volumes, travel speeds, and travel times which were used to calculate user costs and associated impacts such as air quality, energy consumption, etc.). Although these impacts will change on an annual basis (if not more frequently), modeling for two discrete years was judged to be reasonable for purposes of comparing scenarios. The year 2007 was chosen to evaluate various sequences of construction generally in the period between 2005 and 2009. The year 2012 was chosen to evaluate various sequences of construction generally between in the period between 2010 and 2014. This approach is consistent with the sequencing analysis completed for the Final EIS where a single year was modeled for a seven year construction period. Impacts after the year 2014 are generally addressed in the evaluation of various build alternatives in the year 2020 displayed elsewhere in the Supplemental EIS.

Because the major components addressed in the sequencing analysis (I-15, Legacy, or Maximum Transit) are sequenced in three “phases”, the sequencing analysis assigned

three time periods, beginning from 2005 to 2008, 2008 to 2011/2012, and finally 2011/2012 to 2015. In the second time period, analysis was performed both in the model year 2007 and in the model year of 2012, thereby allowing the analysis to transition in the second time period based on the completion of various projects. Figure A1-1 at the end of this attachment shows the schedule for construction of each project for the sequencing scenarios.

Baseline Model Assumptions

In order to make the analysis as accurate as possible, other changes or planned improvements to the highway and transit networks are included as presented in the WFRC LRP. These changes are not tested as individual scenarios or alternatives but are merely included in the baseline of the travel demand model network. While there are no major improvements proposed in the corridor beyond the major investments that are analyzed as sequencing scenarios, several smaller projects were included in the modeling. These projects were part of the WFRC LRP and thus included in the WFRC completed travel model version 3.2. This may not exhaust the list of every small-scale improvement that could occur in the area over the sequencing time period. Short term maintenance of traffic phases that may include short term bottlenecks or restrictions are not included in the sequencing scenarios with the exception of the longer term I-15 reconstruction (to be described). The future projects included in baseline are:

- 500 South widening to 4 lanes from I-15 to 1100 West (2007)
- 500 South widening to 4 lanes from 1100 West to Redwood Road (2012)
- I-15 spot widening to 3 lanes northbound at Beck Street and southbound between I-215 and Beck Street (2007)
- A new I-15 Interchange in South Layton (2007)
- Parrish Lane widening/new construction to 4 lanes from I-15 to Legacy Parkway (2007)
- Various improvements to US-89 including interchange construction (2012)
- Local transit service expansion (2007 and 2012)

With the exception of issues specifically discussed in this attachment, the travel demand model as validated by the WFRC, and all assumptions included within the model, were used in this analysis. The attachment does not include a detailed discussion of the regional travel model process, data, or assumptions. Appendix B to the Supplemental EIS contains that discussion.

Maintenance of Traffic

With respect to maintenance of traffic issues, assumptions made in the modeling do not include closures or restrictions resulting from any other projects identified in the Long Range Plan, with the previously noted exception of I-15 reconstruction. Additionally, any additional projects which require short term or small-scale closures or restrictions are not captured. While such short term closures and restrictions can impact travel, the impact is generally not large enough to significantly effect modeling results.

I-15 reconstruction is certainly the most significant project in terms of maintenance of traffic operations, that is, the traffic impacts of closures and restrictions during

reconstruction. An Environmental Impact Statement has not been completed for this project in which a specific Maintenance of Traffic Plan would be identified. However, through past experiences of projects such as I-15 reconstruction in Salt Lake County and for safety reasons primarily, UDOT maintenance of traffic plans are to restrict I-15 to two full-width (12 foot) lanes in each direction with shoulders during reconstruction.

Transit improvements will generally not require maintenance of traffic restrictions, although minor closures of road crossings during rail construction may occur. Additionally, Legacy Parkway construction is not expected to necessitate maintenance of traffic as it is new construction on mostly undeveloped land. With the exception of temporary interchange restrictions or closings at the tie-in to I-15/U.S. 89 and I-215, maintenance of traffic issues are expected to be minimal and are consequently ignored for the purposes of this sequencing analysis.

Legacy Parkway

Legacy Parkway will be constructed as a freeway with two lanes in each direction of travel. Interchanges will be located at:

- I-15 at Burke Lane (northern terminus for this segment)
- Parrish Lane
- 500 South
- I-215 (southern terminus for this segment)

As previously discussed, there are not anticipated to be any long-term closures or lane restrictions during construction of the Legacy Parkway. A full description of proposed Legacy Parkway improvements can be found elsewhere in the Supplemental EIS.

I-15 Reconstruction

A Draft Environmental Impact Statement (DEIS) for I-15 identified the preferred alternative as four general-purpose lanes and one high-occupancy vehicle (HOV) lane in each direction. Again, a final EIS has not been completed for this portion of I-15, and the preferred alternative from the DEIS was generally assumed. An additional component to the preferred alternative is auxiliary lanes in key locations in the corridor, although these were not included in the model scenarios. In addition, the DEIS recommended that the HOV lane from 2600 South to 600 North might be barrier separated. For the Sequencing Analysis, it was assumed to be only a striped HOV lane, consistent with the remainder of I-15 to the south of the study area.

Maximum Transit Assumptions

The Supplemental EIS process included development of a Maximum Future Transit package. The development of this Maximum Future transit was done as a part of the Integration task and included coordination with a committee of local interests (Community and Public Information Committee)(CPIC). The Maximum Future Transit scenario is described in detail in the Integration Technical Memorandum, and includes, among other features:

Increased Quantity of Transit Service

- Commuter Rail at 15 minute (instead of 20 minute) headways
- Implementation of Bus Rapid Transit along the US-89 Corridor
- High frequency local circulator bus in south Davis County communities
- BRT connections from north/south BRT to commuter rail stations in Farmington and Woods Cross

Improved Quality of Transit Service

- Improved rail/bus coordination representing "seamless transfers" (modeled as a maximum one minute wait time)
- Improved local bus/BRT coordination representing "seamless transfers" (again modeled as a maximum one minute wait time at selected major BRT stations)
- Elimination of premium transit fares on rail modes

Transit Supportive Land Use

- Improved sidewalks and other improvements of walk access to transit stations such that all of Davis County was assumed to have 100 percent walk access to transit
- One half of new population and employment growth in each city in south Davis County surrounding commuter rail and major BRT stations (with City control totals unchanged from the WFRC model)
- TOD surrounding commuter rail and major BRT stations to the extent that it can be modeled with walk access, auto ownership, and fewer persons per household in the growth near transit stations than the remainder of the county
- Transit supportive land uses held constant for all sequencing scenarios

Transit Supportive Pricing Policies

- Elimination of premium transit fares on rail modes
- Doubling the cost of parking in all areas that presently charge for parking (generally the CBD)

An important component to transit use is the attitudes and perceptions of potential transit riders. While travel demand modeling is a competent mathematical tool for predicting traveler behavior, it cannot be expected to adjust the perceptions of riders based on updated or improved transit systems. Traveler behavior is based on a complex series of income, proximity, household size, and number of cars available and is tied to the base year and historic information. This same set of parameters is used to predict future trends. For this reason, the models can predict changes in attitudes about transit only to the extent that they are predicted and included in the socio-economic data that is input into the model.

Summary of Modeling

Due to the complexity of sequences and periods and phases[1], there is no simple way to display the necessary model runs, which provide both portrays the results and captures the various implementation phases of major capital projects. The following page graphically displays the 10 model runs. In addition to these ten, three additional runs were made to establish a base line of analysis in the year 2001, 2007 and 2012. Results of these runs have been tabulated as total volume by traffic link, average speed of each traffic link, transit riders on major transit routes, and average transit speed. Modeling was performed for the afternoon PM peak period, which includes a three-hour period centered on the "peak hour."

[1] As a reminder, "sequence" means the order in time of the major components; and "phase" means one of the three time periods, 2005-2007, 2008-2011/2012 or 2011/2012 to 2020. The modeling involved various permutations of sequences, periods and phases.

Figure A1-1: Sequencing Schedule

Scenario	Project	Order	2005	2006	**2007**	2008	2009	2010	2011	**2012**	2013	2014
			Period 1			**Period 2**				**Period 3**		
1	I-15	Second	Present Configuration			Under Construction				Improved		
	Legacy	Third	Present Configuration							Under Construction		
	Maximum Transit	First	Under Construction			Robust Transit						
2	I-15	Third	Present Configuration							Under Construction		
	Legacy	Second	Present Configuration			Under Construction				Improved		
	Maximum Transit	First	Under Construction			Robust Transit						
3	I-15	Third	Present Configuration							Under Construction		
	Legacy	First	Under Construction			Improved						
	Maximum Transit	First	Under Construction			Robust Transit						
4	I-15	Third	Present Configuration							Under Construction		
	Legacy	First	Under Construction			Improved						
	Maximum Transit	Second	Present Configuration			Under Construction				Improved		

"Wiring Diagram"

A-1
B-1
C-1
D-1

A-2
B-2
C-2
D-2

A-2
B-2
C-2
D-2

A-3
B-3
C-3
D-3

5 Model Runs

5 Model Runs

Attachment 2: Value of Travel Time

Value of Travel Time

The value of time that is spent in traffic congestion can amount to millions of dollars on an annual basis and may equate to values of twenty dollars per person-hour or greater. Real monetary costs can be associated with additional productivity costs, time travel, worker availability, freight inventory, logistics, just-in-time production and market access (Weisbrod and others, 2001). Therefore, to estimate the total value of time spent in traffic congestion, it is best to first estimate the value per person-hour spent in congestion.

In order to estimate the time value of traffic congestion, many factors must be established. The average household income levels, the amount of local, intercity, and truck travel and the distribution of personal and business travel must be determined.

Value of Personal Travelers

Value of travel time for personal travel is the cost to individuals per person-hour spent in congestion. The value of personal travel time is computed as a percentage of household income in earnings per hour (percent value of person travel time x earnings per hour).

Based on the 2000 U.S. Census, the average household income of Davis County, Utah is $53,726. The location of the study area is primarily in Davis County and consequently is the income base used for the determination of the value of congestion. The 2000 income level was inflated by a factor of 1.08 to $58,024 to account for inflation from 2000 to the September 2003 value. The inflation factor of 1.08 was obtained using the CPI Inflation Calculator available online through the Bureau of Labor Statistics. The estimated 2003 household income level was then divided by 2080 hours (approximate number of work hours in a year) to achieve the personal earnings per hour rate for Davis County. Personal earnings per hour are assumed to be the same for both local and intercity travel and are estimated to be $29.01 per person-hour (refer to Table A1).

According to the U.S. Department of Transportation Departmental (DOT) Guidelines for the Valuation of Travel Time in Economic Analysis, the percent value of local personal travel is 50 percent of earnings per hour. This makes the value of personal local travel in Davis County $14.51 per person-hour. The DOT also recommends that the value of personal intercity travel is 70 percent of earnings per hour. In Davis County the value of personal intercity travel is $20.31 per person-hour.

Value of Business Travelers

Value of travel time for business travel is the cost to business per person-hour spent in congestion. The value of business travel time is computed as a percentage of earnings per hour (percent value of business travel time x earnings per hour).

Earnings per hour rates for business travelers were retrieved from the U.S. Bureau of Labor Statistics using Employer Costs for Employee Compensation. The cost of compensation per hour worked was extrapolated from the data for western workers of the United States in private industry. The most recent per hour data was collected from second quarter 2003. The earnings per hour of business travelers were assumed to be the

same as the total cost to employers per hour worked. The value obtained for this study, $23.68 per person-hour, is used for both local and intercity travel.

The DOT advises that business travel time is valued at 100 percent of business earnings per hour. For this study the value of $23.68 per person-hour is used for the business value of travel time for both local and intercity travel.

Value of Truck Drivers

One hundred percent of the earnings per hour of truck drivers are considered a cost of congestion as recommended by the DOT. Any time that truckers must spend in traffic is a cost to the trucking business. The earnings per hour rates for truck drivers were retrieved from the U.S. Bureau of Labor Statistics Employer Cost for Compensation using the total cost of compensation per hour worked for Transportation and Material Moving Occupations. The most recent total employer cost per hour value was published for second quarter 2003. This value, $20.68 per person-hour, is assumed to be equal to earnings per hour of truck drivers.

Travel Distribution Percentage

The travel distribution percentage is the estimated amount of travel that is personal travel and business travel. The travel distribution percentage is different for local, intercity, and truck travel. For the travel distribution percentage in this study, the DOT Guidelines for the Valuation of Travel Time in Economic Analysis recommended percentages were applied. For local travel, 94.4 percent is for personal reasons and 5.6 percent is for business purposes. For intercity travel, 86.9 percent of travel is personal and 13.1 percent of travel is conducted for business.

Weighted Average Travel Time Values

A weighted average local travel time value and a weighted average intercity travel time value were calculated using the percentage of personal and business travel to weight the value of earnings per hour for local travel and for intercity travel, respectively. The weighted average local travel time value is $15.02 per person-hour. The weighted average intercity travel time value is $20.75 per person-hour. Truck drivers use 100 percent of earnings per hour rates for travel because all truck travel is considered for business purposes. The value of time for trucks spent in congestion is $20.68 per person-hour. An overall weighted value of travel time is then computed based on the number of person-hours spent in congestion for local travel, intercity travel, and truck travel. For Davis County, Utah, the Total weighted average time value of congestion is $18.65 per person-hour. The total weighted average time value of congestion in Davis County is used in the sequencing analysis to estimate the total economic cost of congestion for each of the four scenarios under examination. Table A4-1 contains the results of the calculations the time values for various travelers.

Table A4-1: Calculation of Time Value of Congestion

LOCAL TRAVEL											
% of person-hr in traffic	Travel Distribution %		Total Hours		% Values of Travel Time		Local Earn./Hr Rates		Value of Travel Time		Weighted Avg. Local Travel Time Values
	Personal	Business	Personal	Business	Personal	Business	Personal	Business	Personal	Business	
0.365	94.4%	5.6%	0.34456	0.02044	50%	100%	$ 29.01	$ 23.68	$ 14.51	$ 23.68	**$ 15.02**
INTERCITY TRAVEL											
% of person-hr in traffic	Travel Distribution %		Total Hours		% Values of Travel Time		Local Earn./Hr Rates		Value of Travel Time		Weighted Avg. Local Travel Time Values
	Personal	Business	Personal	Business	Personal	Business	Personal	Business	Personal	Business	
0.555	86.9%	13.1%	0.482295	0.072705	70%	100%	$ 29.01	$ 23.68	$ 20.31	$ 23.68	**$ 20.75**
TRUCK											
% of person-hr in traffic	Travel Distribution %		Total Hours		% Values of Travel Time		Earnings/Hour Rates		Value of Travel Time		Weighted Avg. Local Travel Time Values
		Business		Business		Business				Business	
0.08	100%		0.08		100%		$ 20.68		$ 20.68		**$ 20.68**
1 Total Person-Hours					**Total Weighted Average Time Value (per person-hour)**						**$ 18.65**

(1) Personal Local & Intercity Earnings/Hour Rates: The 2003 Median Household Income for Davis County calculated by using the CPI Inflation Calculator available through the Bureau of Labor Statistics. There was a 1.08 inflation rate from 2000 to Sept. 2003.

(3) Business Local & Intercity Earnings/Hour Rates: Earnings per hour rates were retrieved from the U.S. Bureau of Labor Statistics Employer Cost for Employee Compensation for western workers in private industry in the U.S. The most recent per hour data was collected (2nd Quarter 2003).

(4) Truck Drivers: Earnings per hour rates were retrieved from the U.S. Bureau of Labor Statistics Employer Cost for Employee Compensation for the transportation and material moving sector in the U.S. The most recent per hour data was collected (2nd Quarter 2003).

(5) Travel Distribution %: From the DOT; Derived from on-line analysis of PMT data from the 1995 Nationwide Personal Transportation Survey

(6) % of person-hr in traffic for trucks on the roadway is from the UDOT 1999 Records for I-15 as collected by InterPlan.

(7) % of person-hr. in traffic for local travel is an average of % on I-15 and Legacy highways as projected by the traffic models performed by InterPlan.

(8) % of person-hr. in traffic for intercity travel is an assumption that the remaining traffic not local or truck traffic is intercity traffic.

Attachment 3: Energy Usage

Energy Usage by Automobiles and Trucks

Energy usage is calculated by considering the volume of vehicles, speed, energy use coefficients, and type of vehicle.

- Vehicle Volume: The WFRC Traffic Model, Attachment 1 provided the number of vehicles on I-15 and Legacy Parkway during peak afternoon period traveling in the northbound direction. Also included in energy usage calculations are vehicle miles traveled on arterial and connector roads in South Davis County. The energy usage of traffic on these roads is included to account for vehicles which divert off of I-15 during extreme congestion.

- Average Speed: The average speed was calculated by dividing the average peak period speed provided by the model by a factor to determine peak hour speed and peak shoulder hour speeds. The factor for peak hour speed is 1.0909. The factor for peak shoulder hour speeds is 0.9697.

- Energy Use Coefficients: Energy use coefficients are based upon type of vehicle and speed to convert usage to gallons of fuel used (from Traffic Engineering Handbook, 4th Edition, 1999, Institute of Transportation Engineers).

- Type of Vehicle: Traffic models provided the general makeup of the traveling vehicles. Ninety-two percent of vehicles on the road are automobiles and eight percent are trucks.

- Energy Consumption: To determine total energy consumption per year in gallons of fuel, the length of roadways in the North Corridor was multiplied by the number of vehicles, the energy use coefficient corresponding to the average speed, the percent makeup of traffic, and the number of work days per year (260).

The total dollar value of the fuel consumed was calculated by multiplying the total number of gallons of fuel by the average current price of gasoline (for automobiles) and diesel fuel (for trucks) in Salt Lake City.

- The average price of gasoline used in the analysis is $1.58 per gallon. This was the average price of gasoline on November 11, 2003 as provided by AAA (http://www.csaa.com/yourcar/gaspriceschart/0,7077,,0.html).

- The average price of diesel used for the analysis was $1.64. This was the average price of diesel on November 17, 2003 as provided by AAA (http://198.6.95.31/Utmetro.asp).

- The discount rate used for this analysis was 3.00%.

Energy Usage by Transit – Commuter Trains

Energy use for transit was calculated based on the number of miles traveled by transit system and the fuel efficiency of the buses and commuter trains used in the transit system.

- Miles of Bus or Rail: The Traffic models provided the number of miles of transit travel within the North Corridor. The numbers of miles were multiplied by 260 (number of work days per year) to account for the number of miles traveled in a year.

- Fuel Efficiencies: The fuel efficiency of buses used for this analysis was 0.1418 gallons per mile traveled as provided by the American Public Transportation Association (Bus – Power Source Efficiency, http://www.apta.com/research/stats/bus/powereff.cfm, accessed November 17, 2003). The fuel efficiency for commuter trains as provided by the American Public Transportation Association is one gallon per mile (Rail – Power Source Efficiency, http://www.apta.com/research/stats/rail/powereff.cfm, accessed November 17, 2003).

- The average price of diesel used for the analysis was $1.64. This was the average price of diesel on November 17, 2003 as provided by AAA (http://198.6.95.31/Utmetro.asp).

- The discount rate used for this analysis was 3.00%.

Attachment 4: Air Quality Analysis

Air Emissions by Automobiles and Trucks

Emissions for vehicles were calculated using total vehicle miles traveled (VMT) per year by automobiles and trucks on I-15 and Legacy Parkway, and on arterial and connector roads (from WFRC Traffic Model). The VMT on I-15 and Legacy Parkway show the emissions from vehicles using these facilities for each of the sequencing scenarios. The VMT for arterial and connector roads in the North Corridor is included in total emissions to capture the emissions of vehicles that divert off of I-15 during periods of congestion.

Emissions factors for VOCs, NOx, and CO in grams per mile for vehicles were obtained from roadway facility speed emissions curves published in FHWA's Sensitivity Analysis of MOBILE6[2]. Emission rates for PM-10s[3], including tailpipe emissions and roadway dust, were obtained from Iowa DOT[4]. All emission factors are calculated based on speed.

For comparative purposes, the emission factors used for the analysis were assumed constant from 2005 to 2014. Generally, these factors would decrease each year. NAAQS for regional conformity are met for all scenarios in the year 2020 based on recent conformity determination.

Air Emissions by Transit Vehicles

Emissions for buses and commuter trains were calculated using total miles traveled by bus and rail per year (from WFRC Traffic Model) and pounds of emissions released per mile by buses and commuter trains. Emissions factors were provided by the UTA for buses and for commuter trains.

[2] The input parameters for the calculation of speed-based emissions factors were EPA national default data. This report was edited and produced by FHWA Resource Center – Atlanta. http://www.fhwa.dot.gov/resourcecenter/mobile6_v2.pdf. Accessed October 12, 2004.
[3] PM10 emission factors were not available from FHWA's sensitivity analysis.
[4] PM10 emission factors were from IaDOT. www.sysplan.dot.state.ia.us/3-40_Areawide_EFs.PDF, Accessed August 5, 2004.

Attachment 5: Scenario Summary Tables

Table 5-1
Legacy Parkway Sequencing Analysis
Scenario 1 Results

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Construction schedule										
Robust Transit	Under construction			Construction Complete						
Reconstruct I-15				Under construction				Construction complete		
Legacy Parkway								Under construction		
Peak period travel speeds (miles per hour)										
Transit	29.7	29.7	29.7	16.9	16.9	15.3	15.3	32.9	32.9	32.9
I-15	38.5	38.5	38.5	10.7	10.7	13.7	13.7	48.7	48.7	48.7
Legacy Parkway										
Peak period travel times (minutes)										
Transit	20.5	20.5	20.5	45.7	45.7	51.2	51.2	19.7	19.7	19.7
I-15	16.1	16.1	16.1	57.9	57.9	45.3	45.3	12.7	12.7	12.7
Legacy Parkway										
Peak period energy usage (million gallons)										
Transit	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05
I-15	3.24	3.24	3.24	3.20	3.20	2.96	2.60	4.09	4.09	4.09
Legacy Parkway										
Arterials & Collectors (S. Davis Co.)	1,024.25	1,024.25	1,024.25	1,987.57	1,987.57	2,307.93	2,307.93	1,121.88	1,121.88	1,121.88
Total	1,027.51	1,027.51	1,027.51	1,990.82	1,990.82	2,310.94	2,310.57	1,126.01	1,126.01	1,126.01
Cumulative Total	1,027.51	2,055.02	3,082.52	5,073.34	7,064.16	9,375.10	11,685.67	12,811.68	13,937.70	15,063.71
Peak period air pollutants (tons per year)										
VOC's Transit	0.3	0.3	0.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2
I-15	63.5	63.5	63.5	100.5	100.5	83.1	83.1	63.2	63.2	63.2
Legacy Parkway										
Arterials & Collectors (S. Davis Co.)	121.2	121.2	121.2	213.5	213.5	257.4	257.4	119.6	119.6	119.6
Total	184.9	184.9	184.9	321.2	321.2	347.7	347.7	189.9	189.9	189.9
CO Transit	1.4	1.4	1.4	1.7	1.7	1.7	1.7	1.7	1.7	1.7
I-15	971.7	971.7	971.7	1,983.1	1,983.1	1,611.3	1,611.3	904.8	904.8	904.8
Legacy Parkway										
Arterials & Collectors (S. Davis Co.)	1,978.1	1,978.1	1,978.1	2,648.5	2,648.5	3,129.5	3,129.5	2,080.5	2,080.5	2,080.5
Total	2,951.2	2,951.2	2,951.2	4,633.3	4,633.3	4,742.6	4,742.6	2,987.0	2,987.0	2,987.0
NOx's Transit	0.9	0.9	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8
I-15	153.5	153.5	153.5	114.4	114.4	104.8	104.8	190.0	190.0	190.0
Legacy Parkway										
Arterials & Collectors (S. Davis Co.)	189.3	189.3	189.3	259.0	259.0	306.2	306.2	202.2	202.2	202.2
Total	343.7	343.7	343.7	375.1	375.1	412.7	412.7	394.0	394.0	394.0
PM-10 Transit	0.11	0.11	0.11	0.3	0.3	0.3	0.3	0.3	0.3	0.3
I-15	0.9	0.9	0.9	0.6	0.6	0.6	0.6	1.1	1.1	1.1
Legacy Parkway										
Arterials & Collectors (S. Davis Co.)	1.2	1.2	1.2	1.5	1.5	1.7	1.7	1.2	1.2	1.2
Total	2.2	2.2	2.2	2.4	2.4	2.6	2.6	2.5	2.5	2.5
Construction costs ($1,000,000)										
Transit	$ 135.3	$ 135.3	$ 135.3							
I-15				$ 237.8	$ 237.8	$ 237.8	$ 237.8			
Legacy Parkway								$ 142.0	$ 142.0	$ 142.0
Total	$ 135.3	$ 135.3	$ 135.3	$ 237.8	$ 237.8	$ 237.8	$ 237.8	$ 142.0	$ 142.0	$ 142.0
Cumulative Total	$ 135.3	$ 270.7	$ 406.0	$ 643.7	$ 881.5	$ 1,119.2	$ 1,357.0	$ 1,499.0	$ 1,641.0	$ 1,783.0
Peak period costs to the traveling public, including travel time and fuel ($1,000,000)										
Transit	$ 0.7	$ 0.6	$ 0.6	$ 5.2	$ 5.0	$ 5.9	$ 5.7	$ 2.1	$ 2.1	$ 2.0
I-15	$ 45.1	$ 43.8	$ 42.5	$ 110.3	$ 107.1	$ 87.6	$ 85.1	$ 34.5	$ 33.5	$ 32.5
Legacy Parkway										
Total	$ 45.8	$ 44.4	$ 43.1	$ 115.5	$ 112.1	$ 93.5	$ 90.8	$ 36.6	$ 35.5	$ 34.5
Cumulative Total	$ 45.8	$ 90.2	$ 133.4	$ 248.8	$ 360.9	$ 454.4	$ 545.2	$ 581.8	$ 617.3	$ 651.8
Wetlands Impacts, cumulative acreage impacted										
Transit	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4
I-15				14.2	14.2	14.2	14.2	14.2	14.2	14.2
Legacy Parkway								114.0	114.0	114.0
Total	18.4	18.4	18.4	32.6	32.6	32.6	32.6	146.6	146.6	146.6

Table 5-2
Legacy Parkway Sequencing Analysis
Scenario 2 Results

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Construction schedule											
	Robust Transit	Under construction			Construction Complete						
	Reconstruct I-15							Under construction			
	Legacy Parkway				Under construction			Construction complete			
Peak period travel speeds (miles per hour)											
	Transit	29.7	29.7	29.7	32.0	32.0	28.3	27.4	27.4	27.4	27.4
	I-15	38.5	38.5	38.5	42.8	42.8	31.6	27.3	27.3	27.3	27.3
	Legacy Parkway							43.9	43.9	43.9	43.9
Peak period travel times (minutes)											
	Transit	20.5	20.5	20.5	20.1	20.1	22.6	23.2	23.2	23.2	23.2
	I-15	16.1	16.1	16.1	14.5	14.5	19.6	22.7	22.7	22.7	22.7
	Legacy Parkway							16.1	16.1	16.1	16.1
Peak period energy usage (million gallons)											
	Transit	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	I-15	3.24	3.24	3.24	3.23	3.23	3.84	1.99	1.99	1.99	1.99
	Legacy Parkway							1.95	1.95	1.95	1.95
Arterials & Collectors (S. Davis Co.)		1024.25	1024.25	1024.25	1066.79	1066.79	1135.87	1015.52	1015.52	1015.52	1015.52
Total		1027.51	1027.51	1027.51	1070.07	1070.07	1139.76	1019.51	1019.51	1019.51	1019.51
Cumulative Total		1027.51	2055.02	3082.52	4152.59	5222.66	6362.42	7381.93	8401.44	9420.95	10440.46
Peak period air pollutants (tons per year)											
VOC's	Transit	0.26	0.26	0.26	7.2	7.2	7.2	7.2	7.2	7.2	7.2
	I-15	63.5	63.5	63.5	52.8	52.8	70.8	40.3	40.3	40.3	40.3
	Legacy Parkway							31.5	31.5	31.5	31.5
Arterials & Collectors (S. Davis Co.)		121.2	121.2	121.2	116.5	116.5	137.5	123.9	123.9	123.9	123.9
Total		184.9	184.9	184.9	176.4	176.4	215.5	202.8	202.8	202.8	202.8
CO	Transit	1.4	1.4	1.4	1.7	1.7	1.7	1.7	1.7	1.7	1.7
	I-15	971.7	971.7	971.7	780.3	780.3	1,166.2	697.1	697.1	697.1	697.1
	Legacy Parkway							462.2	462.2	462.2	462.2
Arterials & Collectors (S. Davis Co.)		1,978.1	1,978.1	1,978.1	1,950.6	1,950.6	2,162.2	1,923.7	1,923.7	1,923.7	1,923.7
Total		2,951.2	2,951.2	2,951.2	2,732.7	2,732.7	3,330.1	3,084.7	3,084.7	3,084.7	3,084.7
NOx's	Transit	0.9	0.9	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	I-15	153.5	153.5	153.5	138.7	138.7	146.9	75.8	75.8	75.8	75.8
	Legacy Parkway							84.5	84.5	84.5	84.5
Arterials & Collectors (S. Davis Co.)		189.3	189.3	189.3	186.7	186.7	208.9	186.7	186.7	186.7	186.7
Total		343.7	343.7	343.7	327.2	327.2	357.5	348.9	348.9	348.9	348.9
PM-10	Transit	0.11	0.11	0.11	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	I-15	0.9	0.9	0.9	0.8	0.8	0.9	0.5	0.5	0.5	0.5
	Legacy Parkway							0.5	0.5	0.5	0.5
Arterials & Collectors (S. Davis Co.)		1.2	1.2	1.2	1.1	1.1	1.3	1.1	1.1	1.1	1.1
Total		2.2	2.2	2.2	2.2	2.2	2.5	2.4	2.4	2.4	2.4
Construction costs ($1,000,000)											
	Transit	$ 135.3	$ 135.3	$ 135.3							
	I-15							$ 237.8	$ 237.8	$ 237.8	$ 237.8
	Legacy Parkway				$ 142.0	$ 142.0	$ 142.0				
Total		$ 135.3	$ 135.3	$ 135.3	$ 142.0	$ 142.0	$ 142.0	$ 237.8	$ 237.8	$ 237.8	$ 237.8
Cumulative Total		$ 135.3	$ 270.7	$ 406.0	$ 548.0	$ 690.0	$ 832.0	$ 1,069.7	$ 1,307.5	$ 1,545.2	$ 1,783.0
Peak period costs to the traveling public, including travel time and fuel ($1,000,000)											
	Transit	$ 0.7	$ 0.6	$ 0.6	$ 2.3	$ 2.3	$ 2.6	$ 2.6	$ 2.5	$ 2.5	$ 2.4
	I-15	$ 35.6	$ 34.6	$ 33.6	$ 36.5	$ 35.5	$ 43.3	$ 29.8	$ 28.9	$ 28.0	$ 27.2
	Legacy Parkway							$ 19.6	$ 19.1	$ 18.5	$ 18.0
Total		$ 36.3	$ 35.2	$ 34.2	$ 38.8	$ 37.7	$ 45.9	$ 52.0	$ 50.5	$ 49.0	$ 47.6
Cumulative Total		$ 36.3	$ 71.5	$ 105.7	$ 144.5	$ 182.2	$ 228.1	$ 280.1	$ 330.6	$ 379.6	$ 427.2
Wetlands Impacts, cumulative acreage impacted											
	Transit	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4
	I-15							14.2	14.2	14.2	14.2
	Legacy Parkway				114.0	114.0	114.0	114.0	114.0	114.0	114.0
Total		18.4	18.4	18.4	132.4	132.4	132.4	146.6	146.6	146.6	146.6

Table 4-3
Legacy Parkway Sequencing Analysis
Scenario 3 Results

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Construction schedule											
	Robust Transit	Under construction			Construction Complete						
	Reconstruct I-15							Under Construction			
	Legacy Parkway	Under construction			Construction Complete						
Peak period travel speeds (miles per hour)											
	Transit	29.7	29.7	29.7	36.1	36.1	34.8	27.4	27.4	27.4	27.4
	I-15	38.5	38.5	38.5	62.2	62.2	60.1	27.3	27.3	27.3	27.3
	Legacy Parkway				64.1	64.1	60.6	43.9	43.9	43.9	43.9
Peak period travel times (minutes)											
	Transit	20.5	20.5	20.5	18.6	18.6	19.2	23.2	23.2	23.2	23.2
	I-15	16.1	16.1	16.1	10.0	10.0	10.3	22.7	22.7	22.7	22.7
	Legacy Parkway				11.1	11.1	11.7	16.1	16.1	16.1	16.1
Peak period energy usage (million gallons)											
	Transit	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	I-15	3.24	3.24	3.24	2.87	2.87	3.07	1.99	1.99	1.99	1.99
	Legacy Parkway				1.59	1.59	1.93	1.95	1.95	1.95	1.95
Arterials & Collectors (S. Davis Co.)		1024.25	1024.25	1024.25	919.25	919.25	1011.71	1015.52	1015.52	1015.52	1015.52
Total		1027.51	1027.51	1027.51	923.75	923.75	1016.75	1019.51	1019.51	1019.51	1019.51
Cumulative Total		1027.51	2055.02	3082.52	4006.28	4930.03	5946.78	6966.29	7985.80	9005.31	10024.82
Peak period air pollutants (tons per year)											
VOC's	Transit	0.26	0.26	0.26	7.2	7.2	7.2	7.2	7.2	7.2	7.2
	I-15	63.5	63.5	63.5	39.6	39.6	41.4	40.3	40.3	40.3	40.3
	Legacy Parkway				22.5	22.5	25.4	31.5	31.5	31.5	31.5
Arterials & Collectors (S. Davis Co.)		121.2	121.2	121.2	94.0	94.0	105.2	123.9	123.9	123.9	123.9
Total		184.9	184.9	184.9	163.3	163.3	179.2	202.8	202.8	202.8	202.8
CO	Transit	1.4	1.4	1.4	1.7	1.7	1.7	1.7	1.7	1.7	1.7
	I-15	971.7	971.7	971.7	881.2	881.2	844.4	697.1	697.1	697.1	697.1
	Legacy Parkway				545.9	545.9	518.2	462.2	462.2	462.2	462.2
Arterials & Collectors (S. Davis Co.)		1,978.1	1,978.1	1,978.1	1,763.7	1,763.7	1,913.0	1,923.7	1,923.7	1,923.7	1,923.7
Total		2,951.2	2,951.2	2,951.2	3,192.5	3,192.5	3,277.4	3,084.7	3,084.7	3,084.7	3,084.7
NOx's	Transit	0.9	0.9	0.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	I-15	153.5	153.5	153.5	152.8	152.8	156.6	75.8	75.8	75.8	75.8
	Legacy Parkway				88.5	88.5	96.1	84.5	84.5	84.5	84.5
Arterials & Collectors (S. Davis Co.)		189.3	189.3	189.3	173.7	173.7	187.6	186.7	186.7	186.7	186.7
Total		343.7	343.7	343.7	416.8	416.8	442.0	348.9	348.9	348.9	348.9
PM-10	Transit	0.11	0.11	0.11	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	I-15	0.9	0.9	0.9	0.6	0.6	0.6	0.5	0.5	0.5	0.5
	Legacy Parkway				0.3	0.3	0.4	0.5	0.5	0.5	0.5
Arterials & Collectors (S. Davis Co.)		1.2	1.2	1.2	1.0	1.0	1.1	1.1	1.1	1.1	1.1
Total		2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.4	2.4
Construction costs ($1,000,000)											
	Transit	$ 135.3	$ 135.3	$ 135.3							
	I-15							$ 237.8	$ 237.8	$ 237.8	$ 237.8
	Legacy Parkway	$ 142.0	$ 142.0	$ 142.0							
Total		$ 277.3	$ 277.3	$ 277.3	$ -	$ -	$ -	$ 237.8	$ 237.8	$ 237.8	$ 237.8
Cumulative Total		$ 277.3	$ 554.7	$ 832.0	$ 832.0	$ 832.0	$ 832.0	$ 1,069.7	$ 1,307.5	$ 1,545.2	$ 1,783.0
Peak period costs to the traveling public, including travel time and fuel ($1,000,000)											
	Transit	$ 0.7	$ 0.6	$ 0.6	$ 2.1	$ 2.0	$ 2.2	$ 2.6	$ 2.5	$ 2.5	$ 2.4
	I-15	$ 35.6	$ 34.6	$ 33.6	$ 19.6	$ 19.0	$ 20.6	$ 29.8	$ 28.9	$ 28.0	$ 27.2
	Legacy Parkway				$ 10.5	$ 10.1	$ 12.6	$ 19.6	$ 19.1	$ 18.5	$ 18.0
Total		$ 36.3	$ 35.2	$ 34.2	$ 32.2	$ 31.2	$ 35.3	$ 52.0	$ 50.5	$ 49.0	$ 47.6
Cumulative Total		$ 36.3	$ 71.5	$ 105.7	$ 137.8	$ 169.0	$ 204.3	$ 256.3	$ 306.8	$ 355.8	$ 403.4
Wetlands Impacts, cumulative acreage impacted											
	Transit	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4
	I-15							14.2	14.2	14.2	14.2
	Legacy Parkway	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0
Total		132.4	132.4	132.4	132.4	132.4	132.4	146.6	146.6	146.6	146.6

Table 4-4
Legacy Parkway Sequencing Analysis
Scenario 4 Results

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Construction schedule											
	Robust transit				Under construction			Construction complete			
	Reconstruct I-15							Under construction			
	Legacy Parkway	Under construction			Construction Complete						
Peak period travel speeds (miles per hour)											
	Transit	29.7	29.7	29.7	34.0	34.0	34.0	27.4	27.4	27.4	27.4
	I-15	38.5	38.5	38.5	61.4	61.4	59.2	27.3	27.3	27.3	27.3
	Legacy Parkway				63.7	63.7	59.1	43.9	43.9	43.9	43.9
Peak period travel times (minutes)											
	Transit	20.5	20.5	20.5	18.6	18.6	18.6	23.2	23.2	23.2	23.2
	I-15	16.1	16.1	16.1	10.1	10.1	10.5	22.7	22.7	22.7	22.7
	Legacy Parkway				11.1	11.1	12.0	16.1	16.1	16.1	16.1
Peak period energy usage (million gallons)											
	Transit	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05
	I-15	3.24	3.24	3.24	2.95	2.59	3.14	1.99	1.99	1.99	1.99
	Legacy Parkway				1.64	1.64	1.97	1.95	1.95	1.95	1.95
Arterials & Collectors (S. Davis Co.)		1024.25	1024.25	1024.25	936.43	936.43	958.32	1015.52	1015.52	1015.52	1015.52
Total		1027.51	1027.51	1027.51	941.04	940.68	963.44	1019.51	1019.51	1019.51	1019.51
Cumulative Total		1027.51	2055.02	3082.52	4023.56	4964.24	5927.68	6947.19	7966.70	8986.21	10005.73
Peak period air pollutants (tons per year)											
VOC's	Transit	0.3	0.3	0.3	0.3	0.3	0.3	7.2	7.2	7.2	7.2
	I-15	63.5	63.5	63.5	40.4	40.4	41.7	40.3	40.3	40.3	40.3
	Legacy Parkway				22.9	22.9	25.9	31.5	31.5	31.5	31.5
Arterials & Collectors (S. Davis Co.)		121.2	121.2	121.2	96.6	96.6	99.7	123.9	123.9	123.9	123.9
Total		184.9	184.9	184.9	160.1	160.1	167.5	202.8	202.8	202.8	202.8
CO	Transit	1.4	1.4	1.4	1.4	1.4	1.4	1.7	1.7	1.7	1.7
	I-15	971.7	971.7	971.7	860.2	860.2	794.6	697.1	697.1	697.1	697.1
	Legacy Parkway				530.3	530.3	493.1	462.2	462.2	462.2	462.2
Arterials & Collectors (S. Davis Co.)		1,978.1	1,978.1	1,978.1	1,783.7	1,783.7	1,812.1	1,923.7	1,923.7	1,923.7	1,923.7
Total		2,951.2	2,951.2	2,951.2	3,175.6	3,175.6	3,101.2	3,084.7	3,084.7	3,084.7	3,084.7
NOx's	Transit	0.9	0.9	0.9	1.0	1.0	1.0	1.8	1.8	1.8	1.8
	I-15	153.5	153.5	153.5	154.3	154.3	156.6	75.8	75.8	75.8	75.8
	Legacy Parkway				88.9	88.9	97.2	84.5	84.5	84.5	84.5
Arterials & Collectors (S. Davis Co.)		189.3	189.3	189.3	175.3	175.3	177.7	186.7	186.7	186.7	186.7
Total		343.7	343.7	343.7	419.4	419.4	432.5	348.9	348.9	348.9	348.9
PM-10	Transit	0.11	0.11	0.11	0.11	0.11	0.11	0.3	0.3	0.3	0.3
	I-15	0.9	0.9	0.9	0.6	0.6	0.7	0.5	0.5	0.5	0.5
	Legacy Parkway				0.3	0.3	0.4	0.5	0.5	0.5	0.5
Arterials & Collectors (S. Davis Co.)		1.2	1.2	1.2	1.0	1.0	1.0	1.1	1.1	1.1	1.1
Total		2.2	2.2	2.2	2.0	2.0	2.2	2.4	2.4	2.4	2.4
Construction costs ($1,000,000)											
	Transit				$ 135.3	$ 135.3	$ 135.3				
	I-15							$ 237.8	$ 237.8	$ 237.8	$ 237.8
	Legacy Parkway	$ 142.0	$ 142.0	$ 142.0							
Total		$ 142.0	$ 142.0	$ 142.0	$ 135.3	$ 135.3	$ 135.3	$ 237.8	$ 237.8	$ 237.8	$ 237.8
Cumulative Total		$ 142.0	$ 284.0	$ 426.0	$ 561.3	$ 696.7	$ 832.0	$ 1,069.7	$ 1,307.5	$ 1,545.2	$ 1,783.0
Peak period costs to the traveling public, including travel time and fuel ($1,000,000)											
	Transit	$ 0.7	$ 0.6	$ 0.6	$ 0.5	$ 0.5	$ 0.5	$ 2.6	$ 2.5	$ 2.5	$ 2.4
	I-15	$ 35.6	$ 34.6	$ 33.6	$ 20.5	$ 19.9	$ 21.4	$ 29.8	$ 28.9	$ 28.0	$ 27.2
	Legacy Parkway				$ 10.8	$ 10.5	$ 13.3	$ 19.6	$ 19.1	$ 18.5	$ 18.0
Total		$ 36.3	$ 35.2	$ 34.2	$ 31.9	$ 31.0	$ 35.2	$ 52.0	$ 50.5	$ 49.0	$ 47.6
Cumulative Total		$ 36.3	$ 71.5	$ 105.6	$ 137.6	$ 168.5	$ 203.7	$ 255.7	$ 306.2	$ 355.2	$ 402.8
Wetlands Impacts, cumulative acreage impacted											
	Transit	-	-	-	18.4	18.4	18.4	18.4	18.4	18.4	18.4
	I-15							14.2	14.2	14.2	14.2
	Legacy Parkway	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0	114.0
Total		114.0	114.0	114.0	132.4	132.4	132.4	146.6	146.6	146.6	146.6

Attachment 6: Additional Comparison Figures

Part 1 Additional Analysis

The following figures provide additional information that can be utilized to compare Scenario 3 to Scenario 4. All figures are in sequential order with the text.

Costs to the Traveling Public

Costs to the traveling public are composed of the value of time spent in commute and the cost of energy, or, in the case of Maximum Transit, a fare. Total annual costs to the traveling public and costs per individual of traveling on I-15, Legacy, and commuting with Maximum Transit are shown below in Figures 6-1 through 6-4, respectively. The costs depicted are only for the afternoon peak period.

Figure 6-1 Scenarios 3 and 4
Annual Costs to the Traveling Public

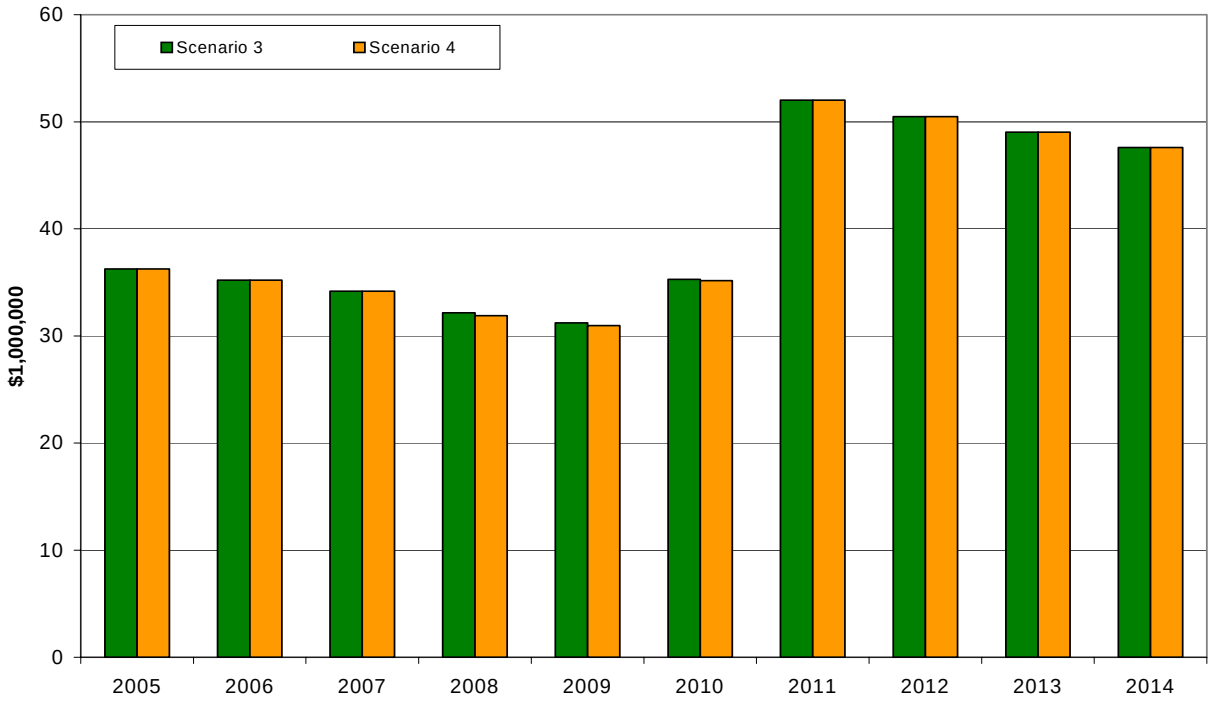


Figure 6-2 Scenarios 3 and 4
I-15 Total Cost Per Traveler Per Year

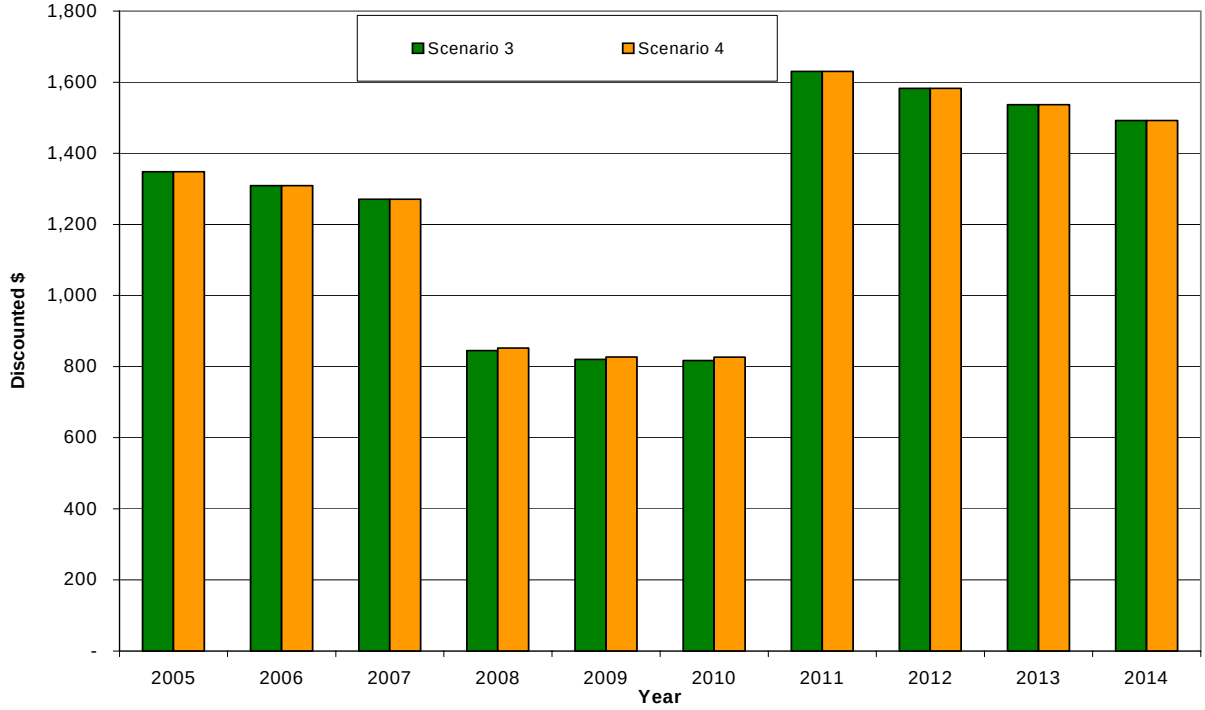


Figure 6-3 Scenarios 3 and 4
Legacy Total Cost Per Traveler Per Year

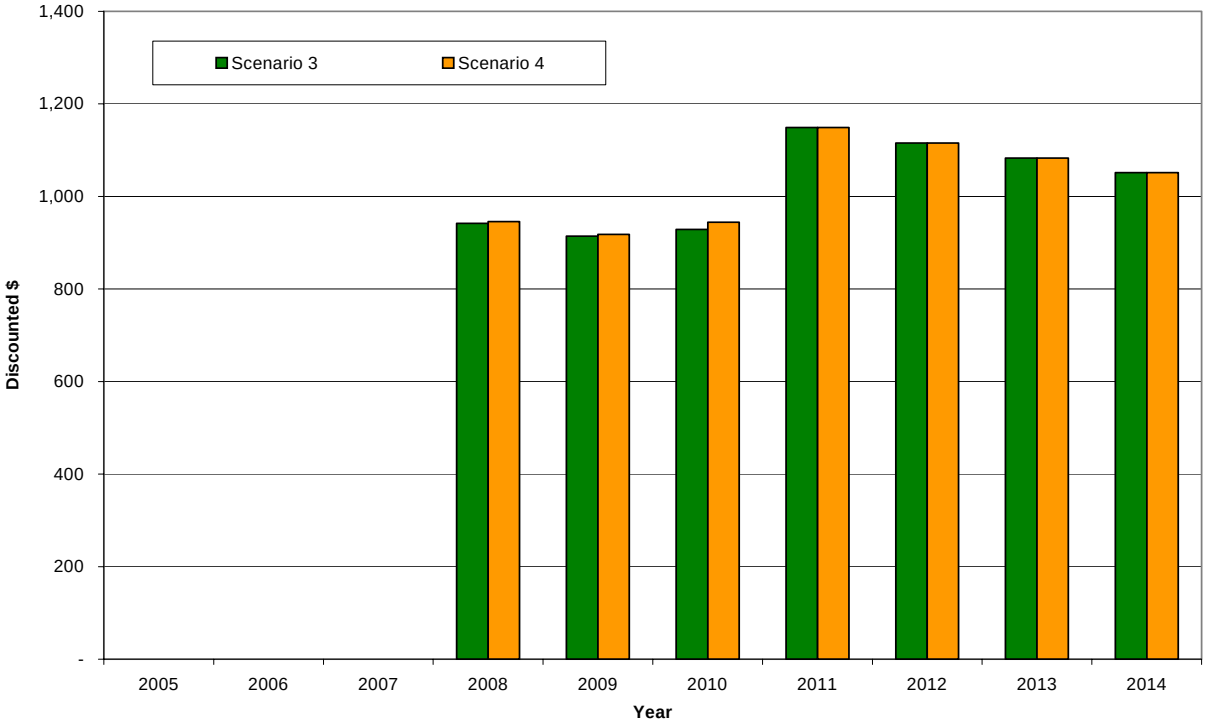
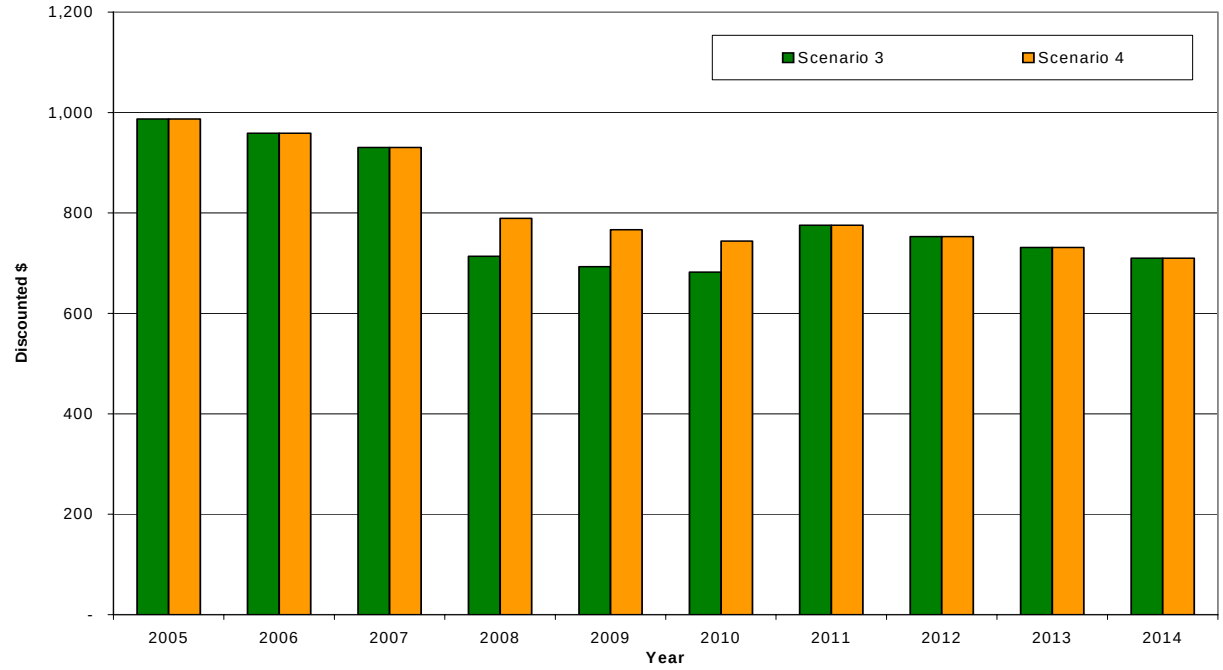


Figure 6-4 Scenarios 3 and 4
Transit Total Cost Per Traveler Per Year



Average Travel Times

Components of the calculation of costs to the traveling public are speed and travel times. Average travel times are calculated for travel within the North Corridor bounded by U.S. 89 and the I-215 interchange during the study period, 2005 to 2014. Figures 6-5, 6-6, and 6-7 show individual yearly travel times for I-15, Legacy Parkway, and transit riders respectively. These travel times are only for the PM peak period.

Figure 6-5 Scenarios 3 and 4
I-15 Travel Time Per Individual Per Year (in Hours)

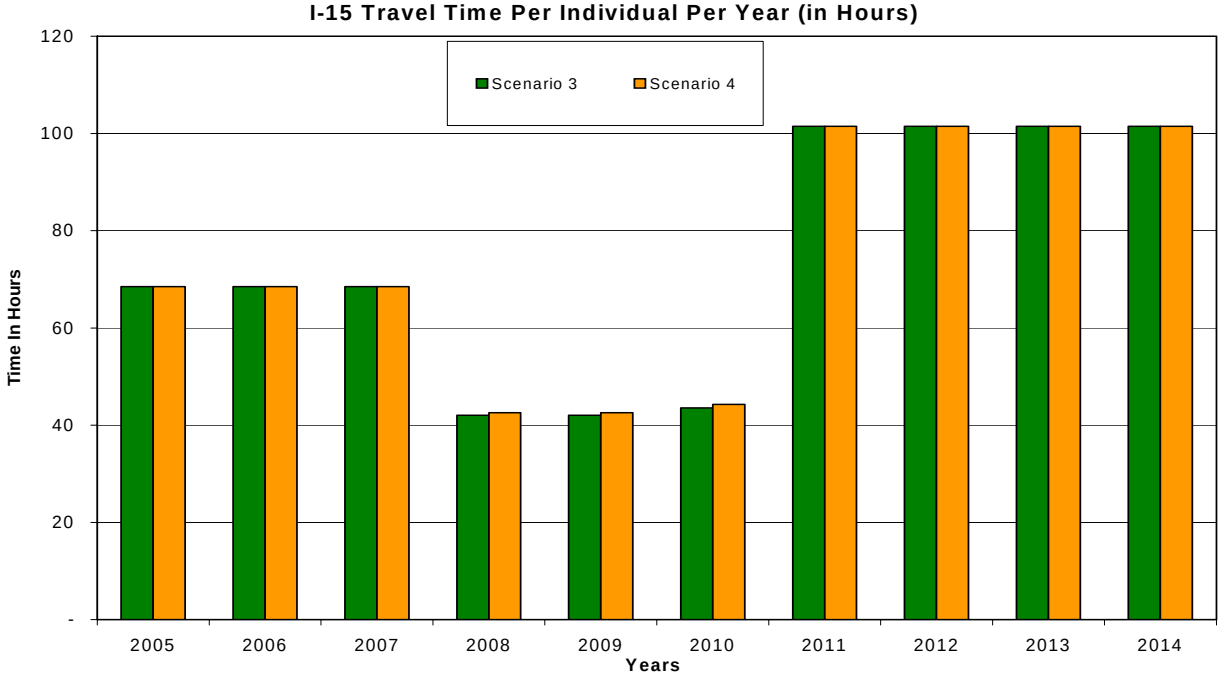


Figure 6-6 Scenarios 3 and 4
Legacy Travel Time Per Person Per Year

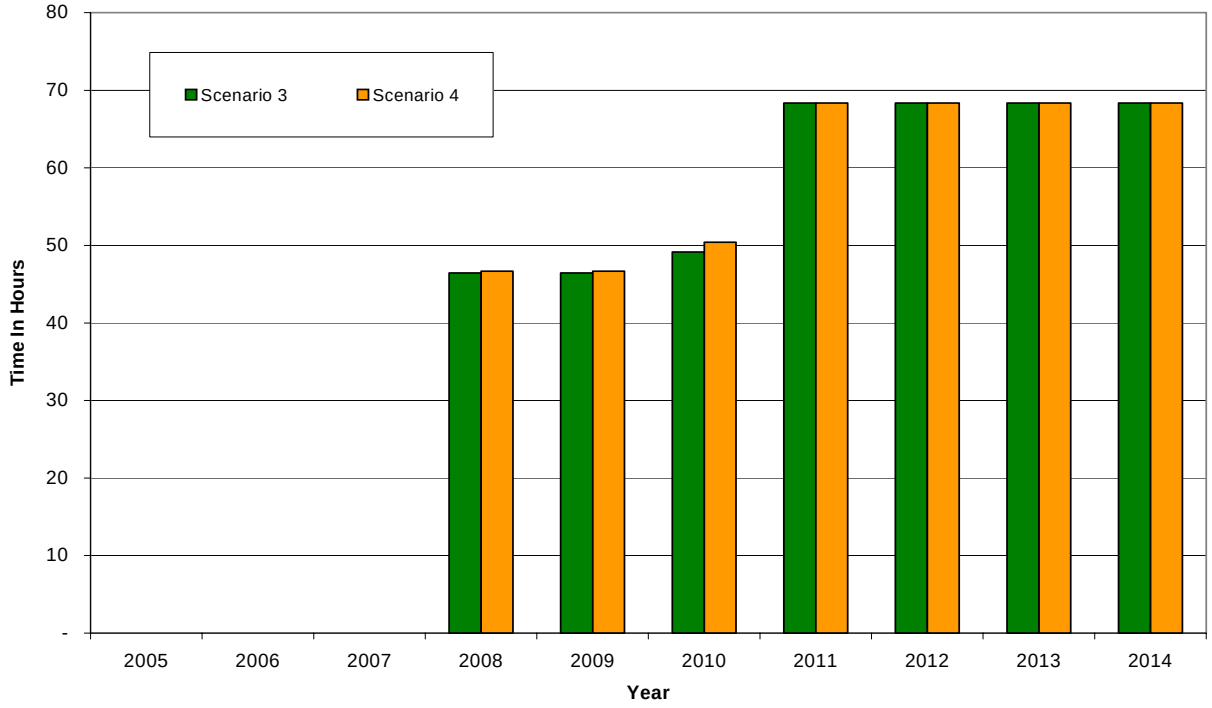
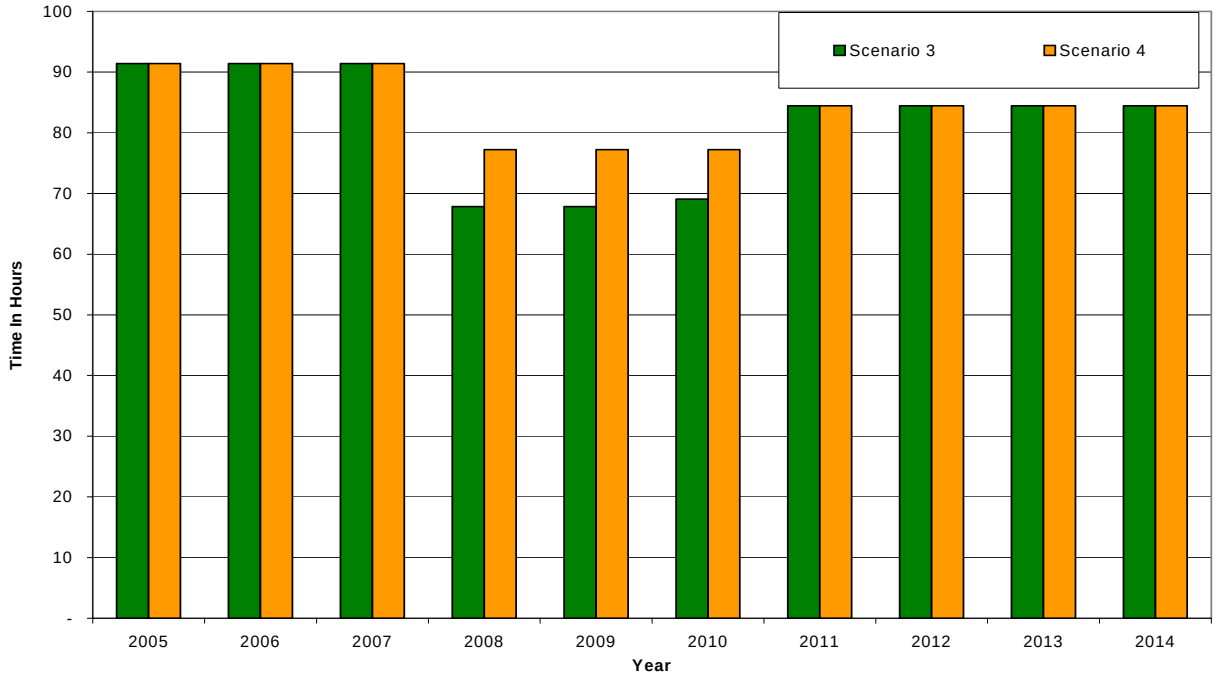


Figure 6-7 Scenarios 3 and 4
Transit Travel Time Per Person Per Year (in Hours)



Air Emissions

Figures 6-8 through 6-11 show the emissions for VOC's, CO, NOx, and PM-10, respectively. For comparative purposes, the emission factors used for this analysis were assumed constant from 2005 to 2014. Generally, these factors would be expected to decrease over time with improving technologies. NAAQS for regional conformity are met for both scenarios in the year 2020 based on recent conformity determination. These emissions are for the PM peak period and for emissions released from one of the components of the Shared Solution or emissions from vehicles diverted to arterial and connector thoroughfares in the North Corridor. An air emissions balance for the entire air shed over the study area is not calculated. All scenarios reflect likely conformity based on WFRCs current conformity analysis.

Figure 6-8 Scenarios 3 and 4
Peak Period Air Pollutants: VOC's

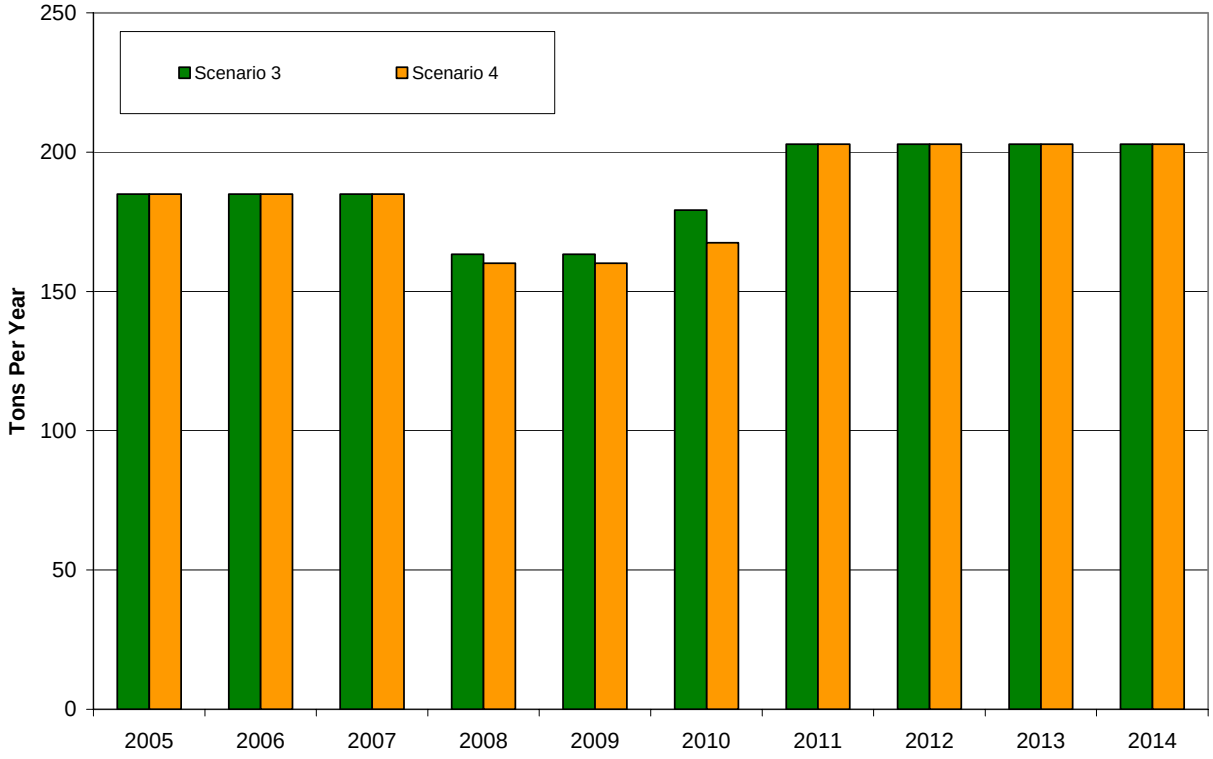


Figure 6-9 Scenarios 3 and 4
Peak Period Air Pollutants: CO

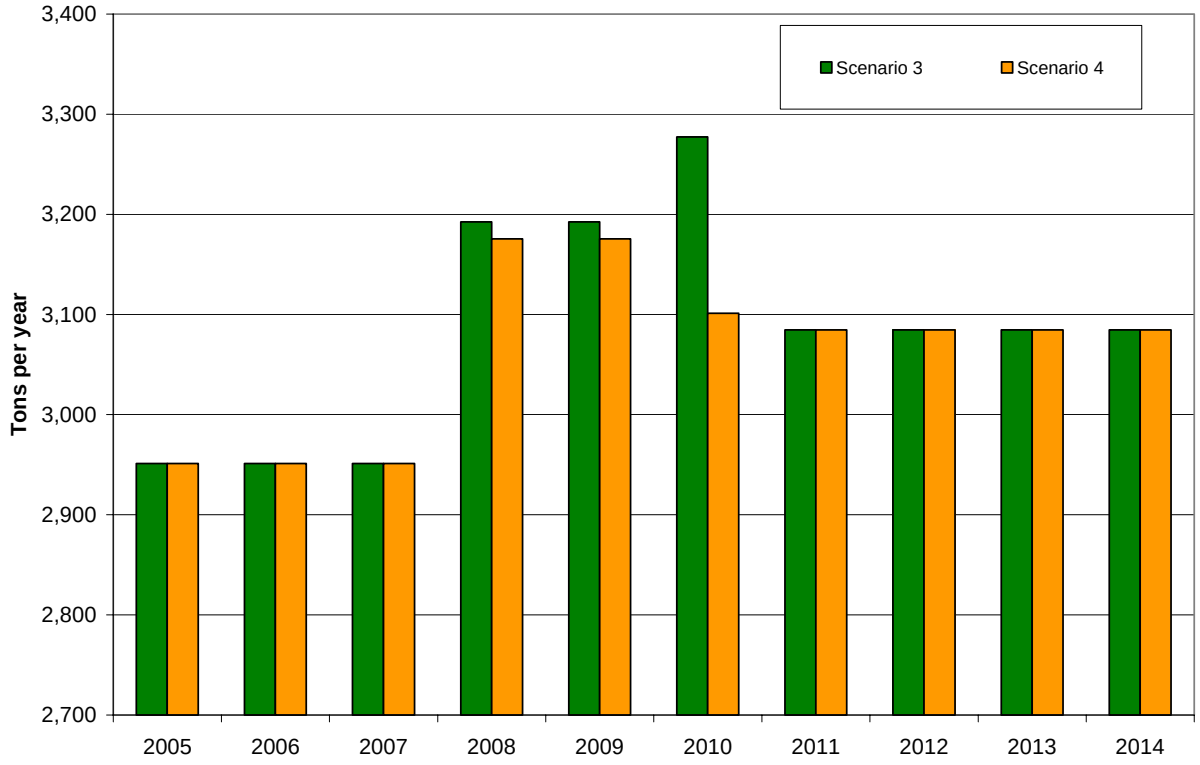


Figure 6-10 Scenarios 3 and 4
Peak Period Air Pollutants: NOx's

Figure 6-11 Scenarios 3 and 4
Peak Period Air Pollutants: PM-10's

Part 2 Additional Analysis

The following figures provide additional information that can be utilized to compare Scenario 1 to Scenario 3. All figures are in sequential order with the text.

Costs to the Traveling Public

Costs to the traveling public are composed of the value of time spent in commute and the cost of energy, or, in the case of Maximum Transit, a fare. Total annual costs to the traveling public and costs per individual of traveling on I-15, Legacy, and commuting with Maximum Transit are shown below in Figures 6-12 through 6-15 respectively. Costs are only for the PM peak period.

Figure 6-12 Scenarios 1 and 3
Annual Costs to the Traveling Public

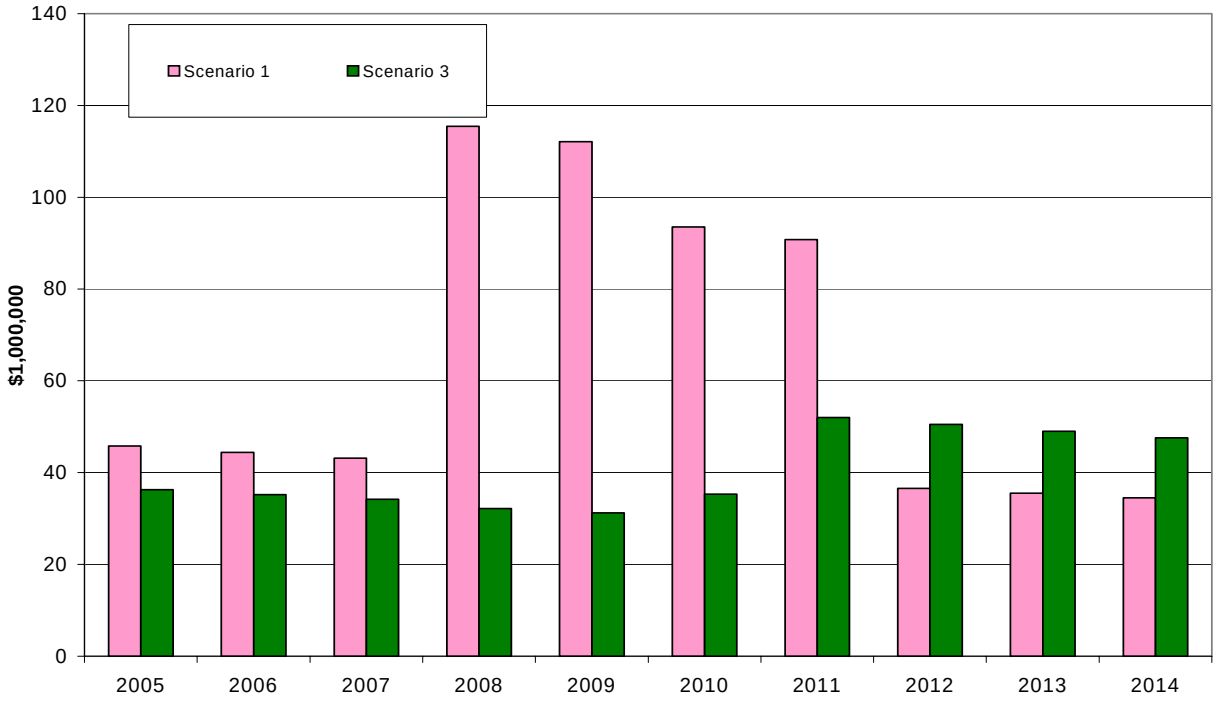


Figure 6-13 Scenarios 1 and 3
I-15 Total Cost Per Traveler Per Year

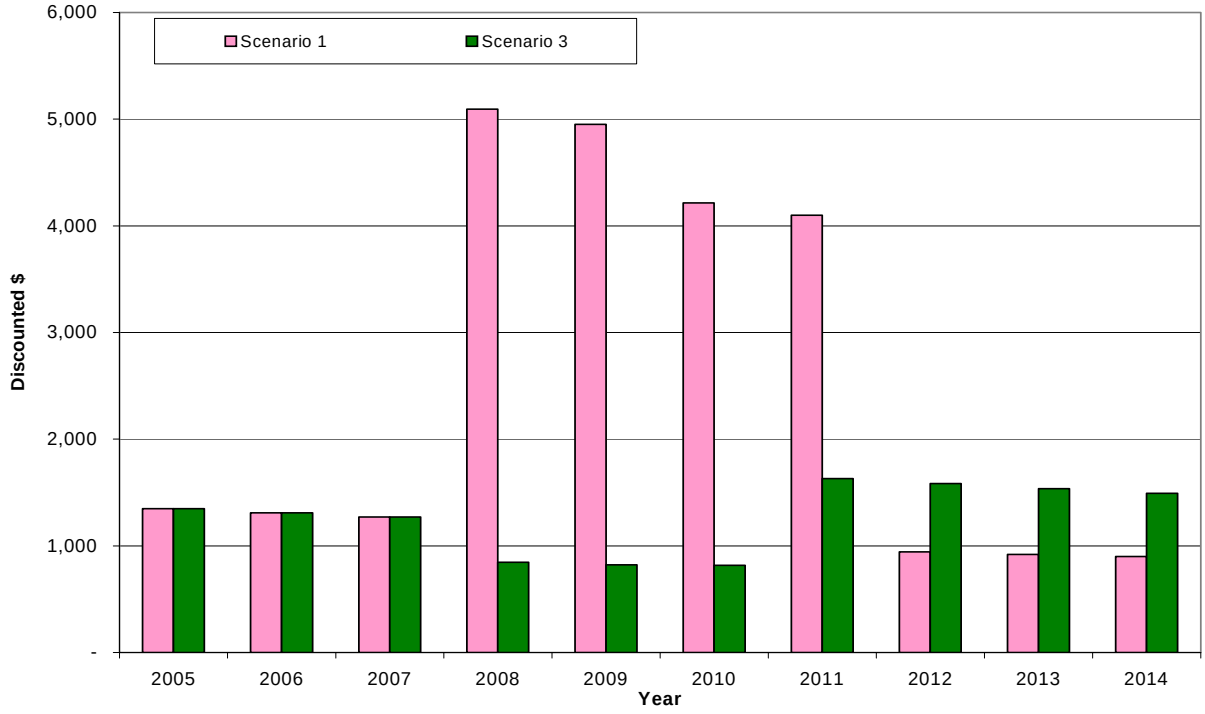


Figure 6-14 Scenarios 1 and 3
Legacy Total Cost Per Traveler Per Year

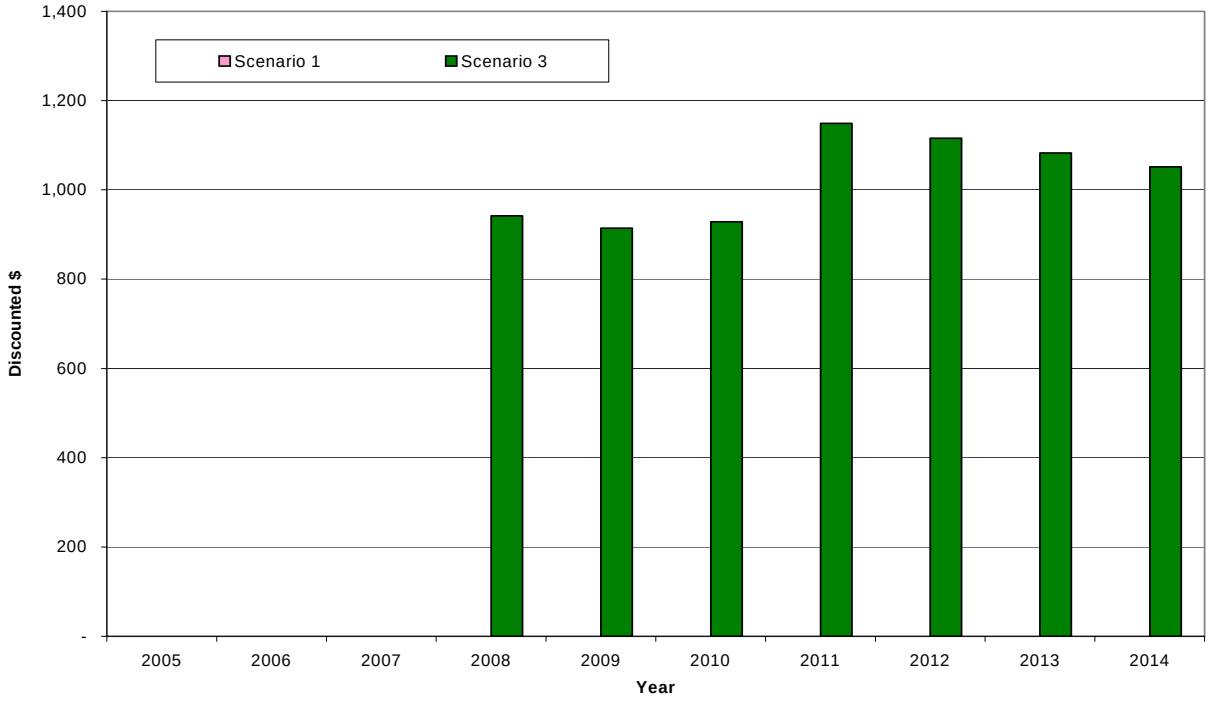


Figure 6-15 Scenarios 1 and 3
Transit Total Cost Per Traveler Per Year

Average Travel Times

Components of the calculation of costs to the traveling public are speed and travel times. Average travel times are calculated for travel within the North Corridor bounded by U.S. 89 and

the I-215 interchange during the study period, 2005 to 2014. Figures 6-16 through 6-18 show the yearly travel times for persons using I-15, Legacy Parkway, and transit respectively. These times are only for the PM peak
period.

Figure 6-16 Scenarios 1 and 3
I-15 Travel Time Per Individual Per Year (in Hours)

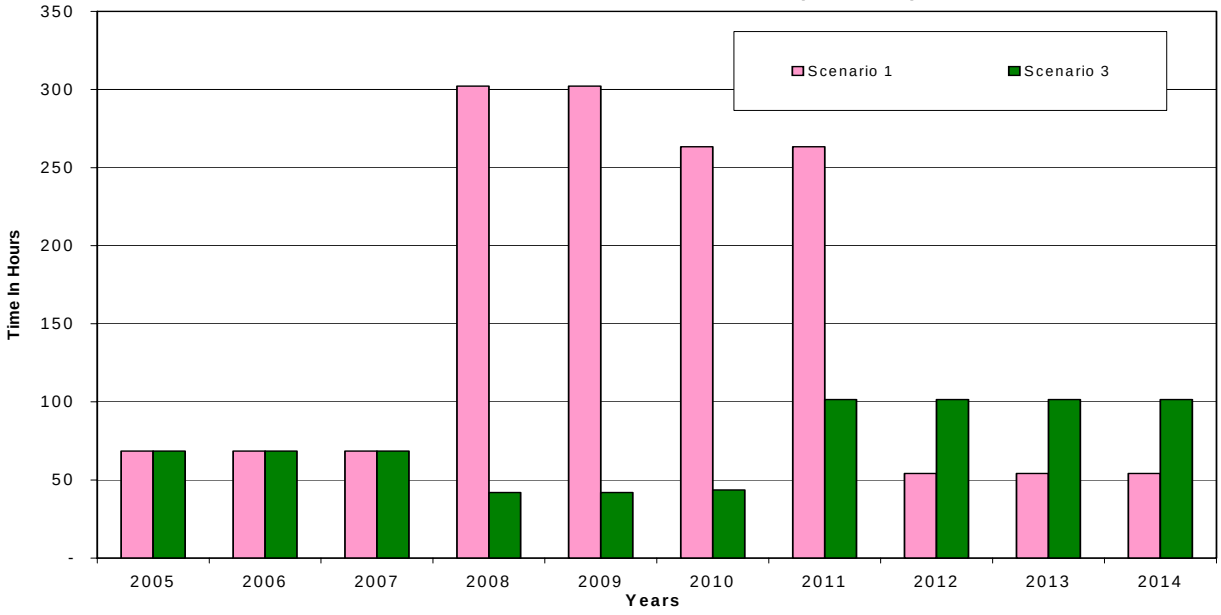


Figure 6-17 Scenarios 1 and 3
Legacy Travel Time Per Person Per Year

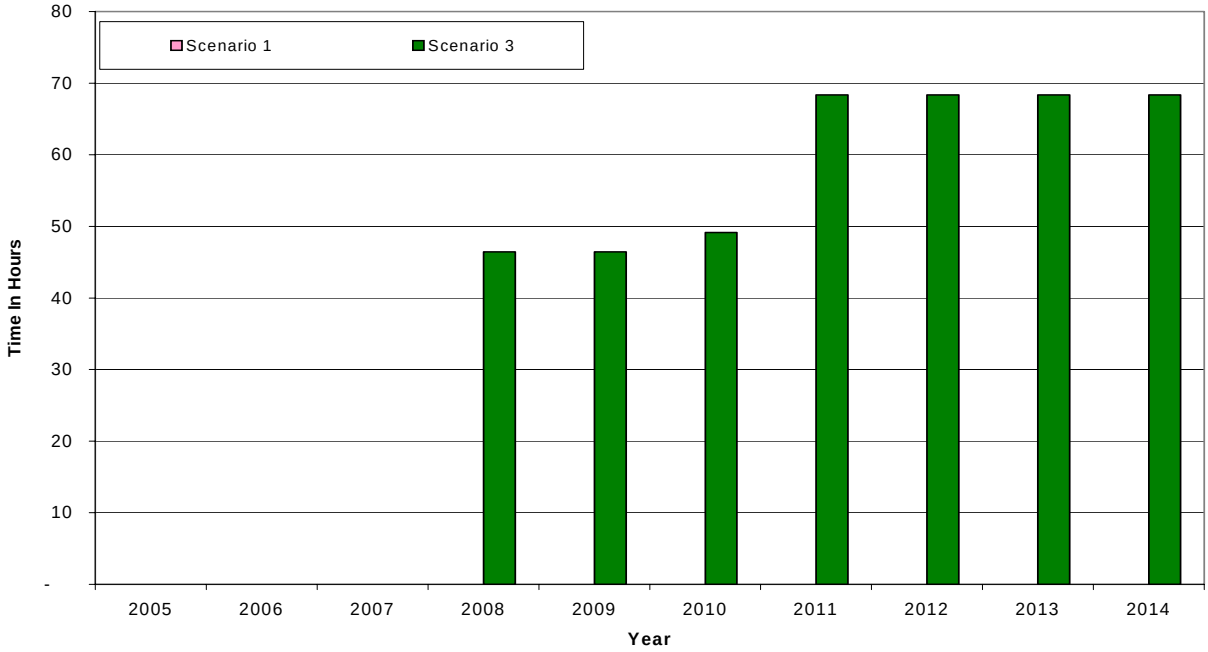
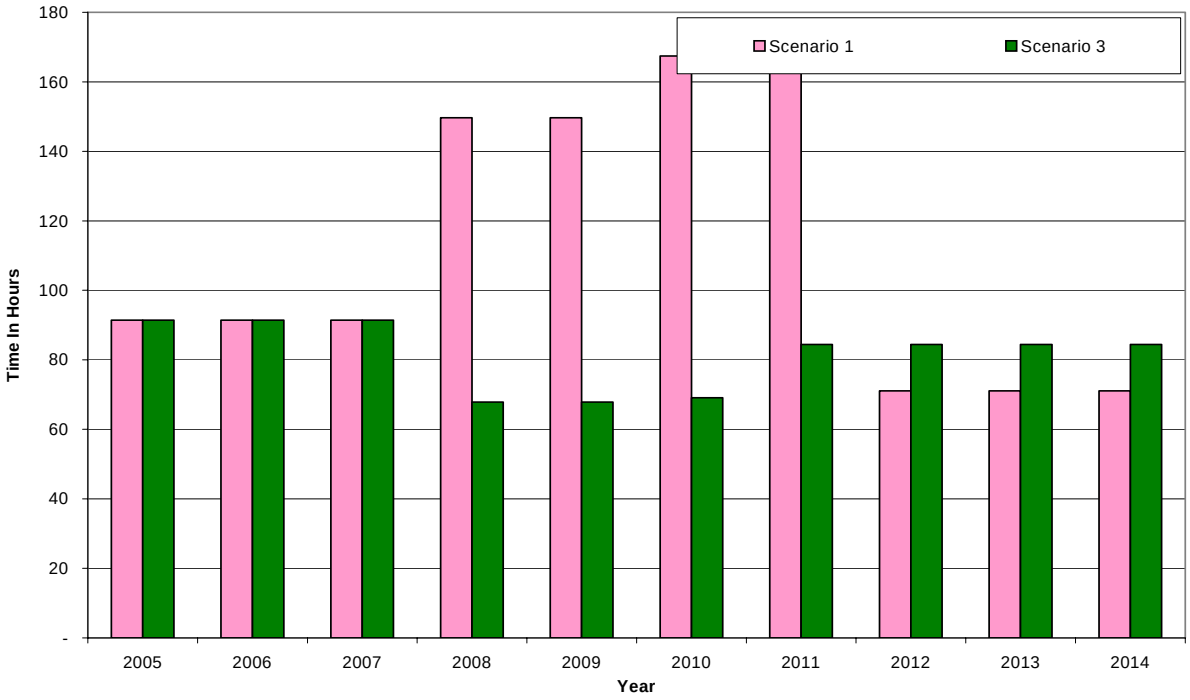


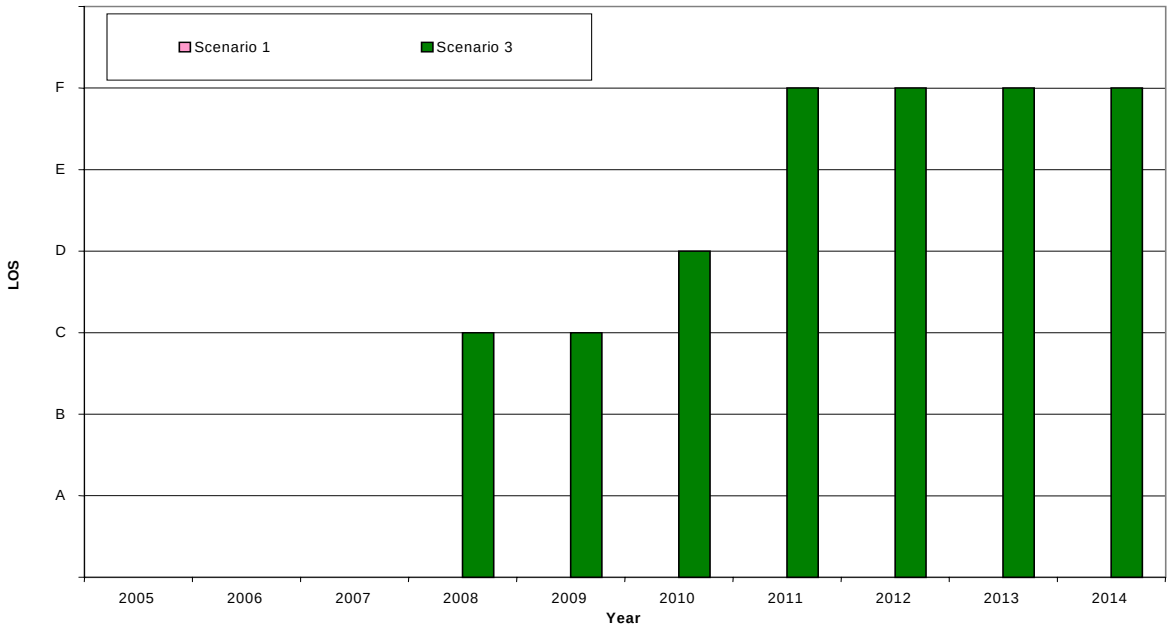
Figure 6-18 Scenarios 1 and 3
Transit Travel Time Per Person Per Year (in Hours)



Level of Service

One indicator of speed and travel time is the level of service. Level of service (LOS) is a well-known measure of roadway congestion. LOS A represents free flow conditions, while LOS F represents stop-and-go traffic nearing a system failure. Figure 6-19 shows the LOS on the Legacy Parkway for Scenario 3. No LOS for the Parkway is shown for Scenario 1 because, under this scenario, it would not become operational until 2015.

Figure 6-19 Scenarios 1 and 3
Legacy Level of Service



Air Emissions

Figures 6-20 through 6-23 show VOC's, CO, NOx, and PM-10, respectively. For comparative purposes, the emission factors used for this analysis were assumed constant from 2005 to 2014. Generally, these factors would be expected to decrease over time with improving technologies. NAAQS for regional conformity are met for both scenarios in the year 2020 based on recent conformity determination. These emissions are for the PM peak period and for emissions released from one of the components of the Shared Solution or emissions from vehicles diverted to arterial and connector thoroughfares within the North Corridor. An air emissions balance for the entire air shed over the study area is not calculated. All scenarios reflect likely conformity based on WFRCs current conformity analysis.

Figure 6-20 Scenarios 1 and 3
Peak Period Air Pollutants: VOC's

Figure 6-21 Scenarios 1 and 3
Peak Period Air Pollutants: CO

Figure 6-22 Scenarios 1 and 3
Peak Period Air Pollutants: NOx's

Figure 6-23 Scenarios 1 and 3
Peak Period Air Pollutants: PM-10's

Part 3 Additional Analysis

The following figures provide additional information that can be utilized to compare Scenario 2 to Scenario 3. All figures are in sequential order with the text.

Costs to the Traveling Public

Costs to the traveling public are composed of the value of time spent in commute and the cost of energy, or, in the case of Maximum Transit, a fare. Total annual costs to the traveling public and costs per individual of traveling on I-15, Legacy, and commuting with Maximum Transit are shown below in Figures 6-24 through 6-27 respectively. Costs shown are only for the PM peak period.

Figure 6-24 Scenarios 2 and 3
Annual Costs to the Traveling Public

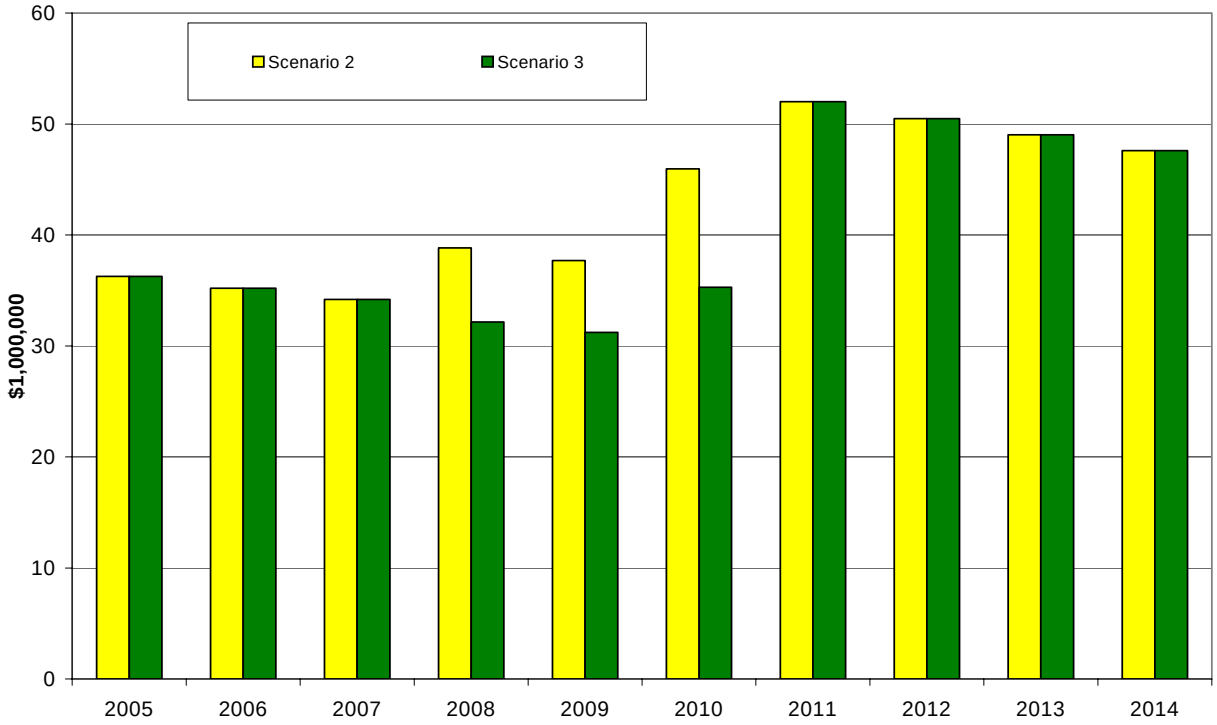


Figure 6-25 Scenarios 2 and 3
I-15 Total Cost Per Traveler Per Year

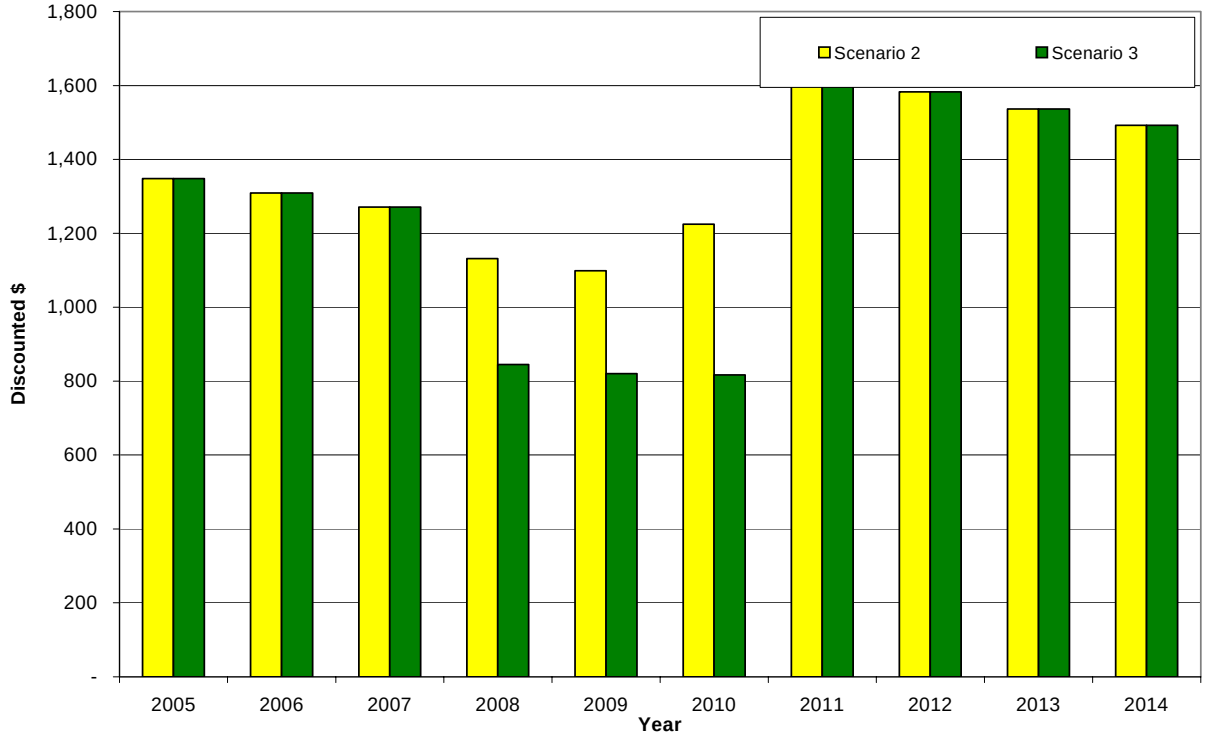


Figure 6-26 Scenarios 2 and 3
Legacy Total Cost Per Traveler Per Year

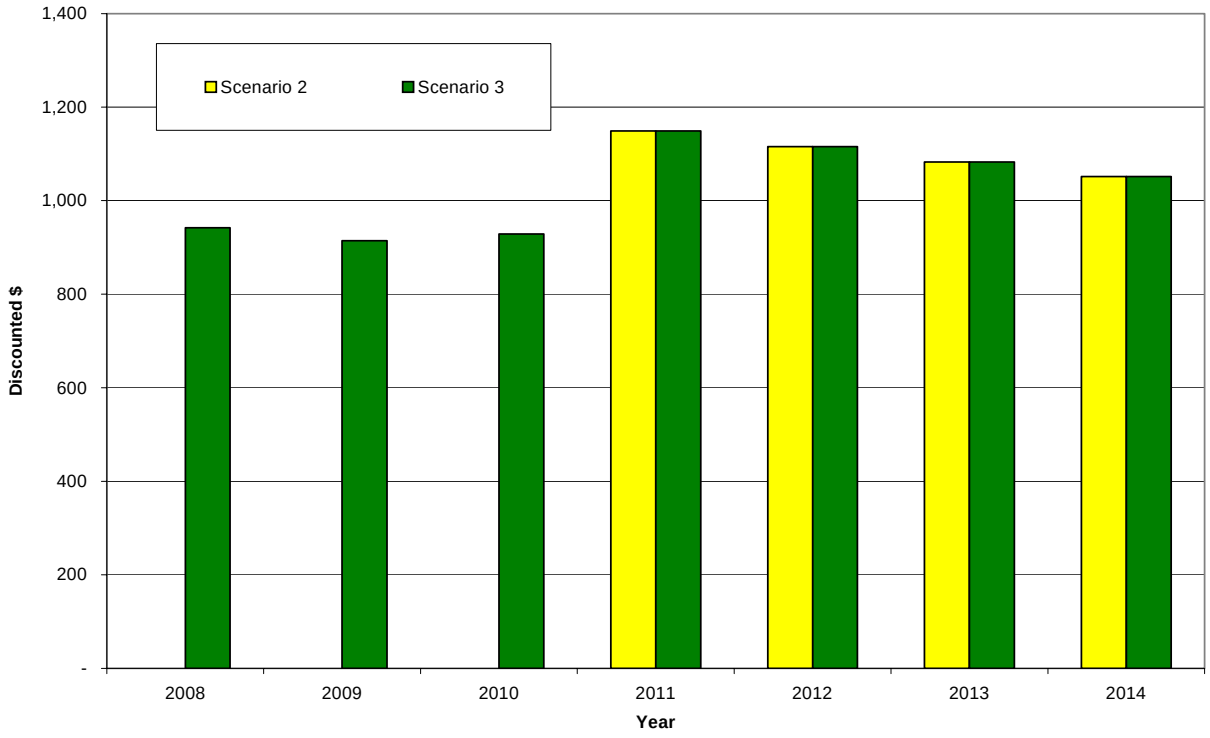
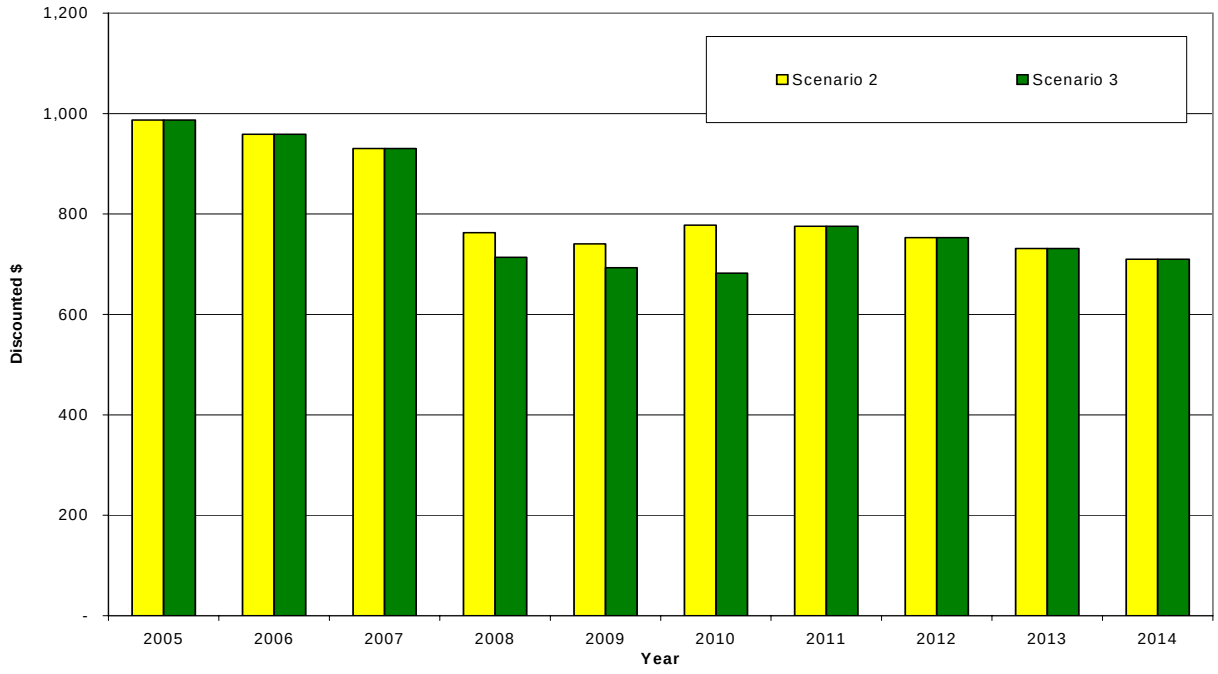


Figure 6-27 Scenarios 2 and 3
Transit Total Cost Per Traveler Per Year



Average Travel Times

Components of the calculation of costs to the traveling public are speed and travel times. Average travel times are calculated for travel within the North Corridor bounded by U.S. 89 and

the I-215 interchange during the study period, 2005 to 2014. Figures 6-28 through 6-30 show the yearly travel times for individuals using I-15, Legacy Parkway, and transit respectively. These times are only for the PM peak period.

Figure 6-28 Scenarios 2 and 3
I-15 Travel Time Per Individual Per Year (in Hours)

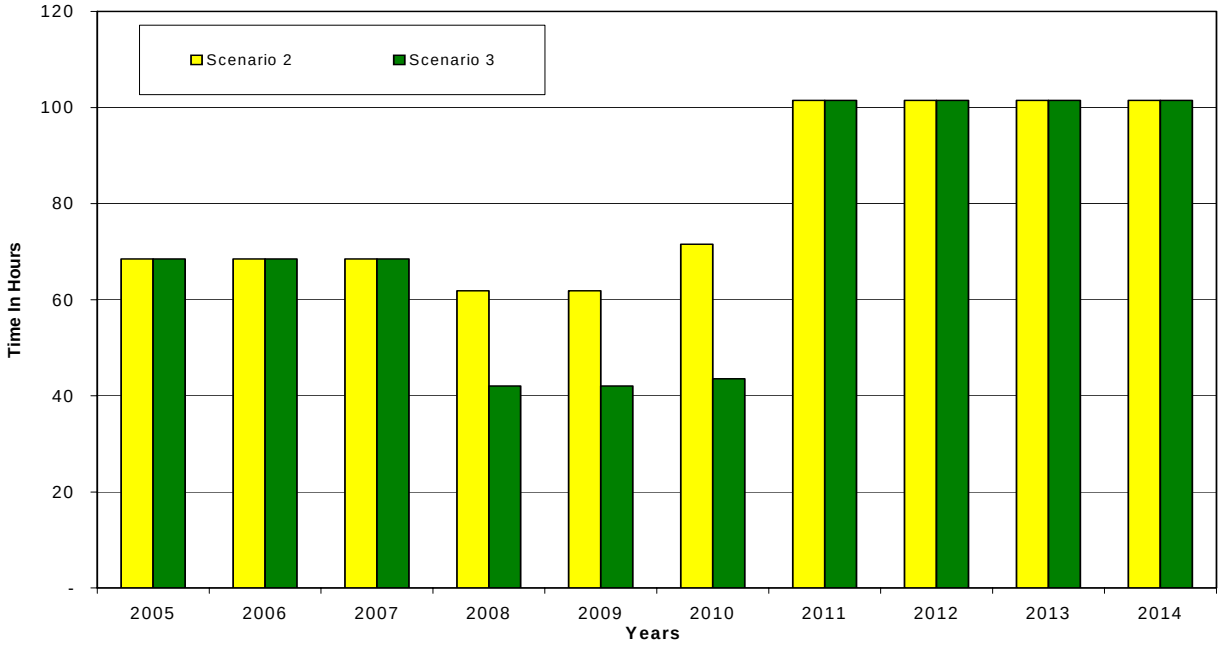


Figure 6-29 Scenarios 2 and 3
Legacy Travel Time Per Person Per Year

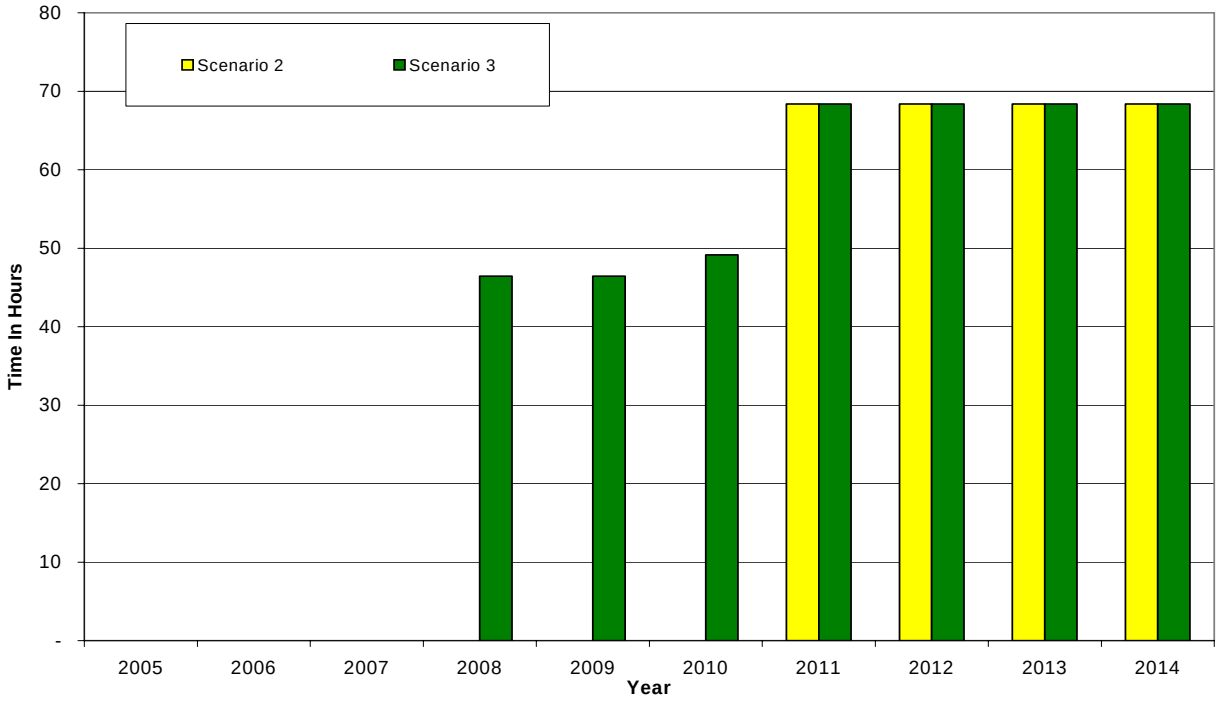
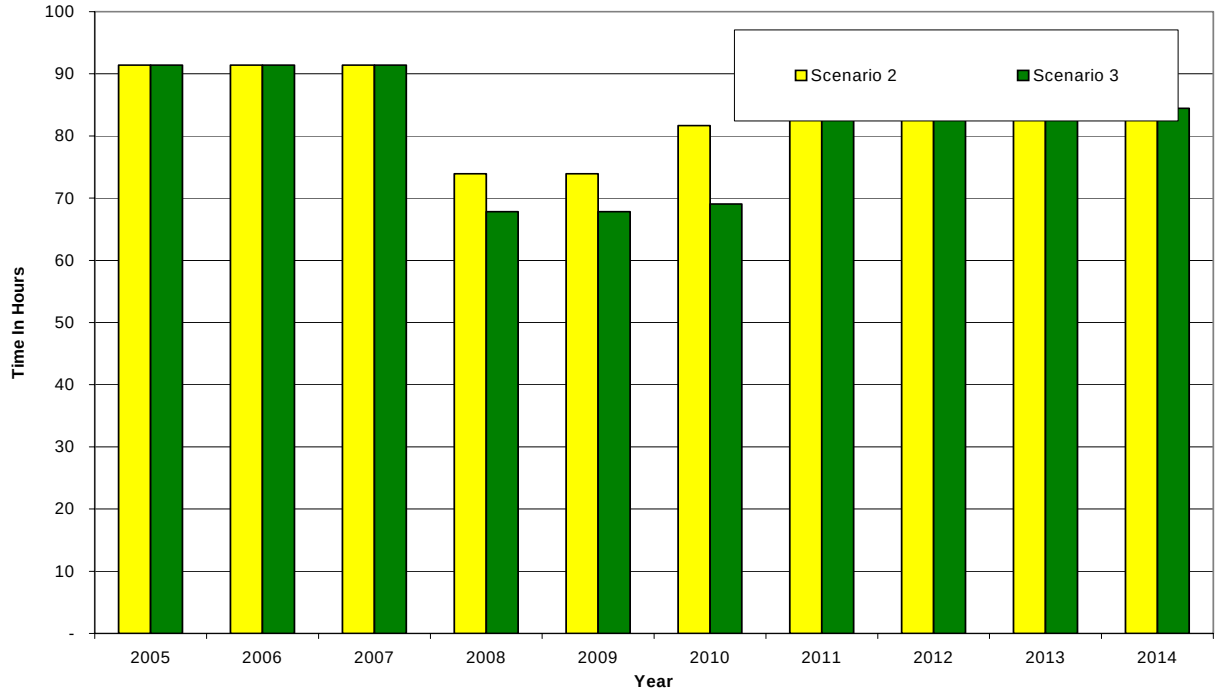


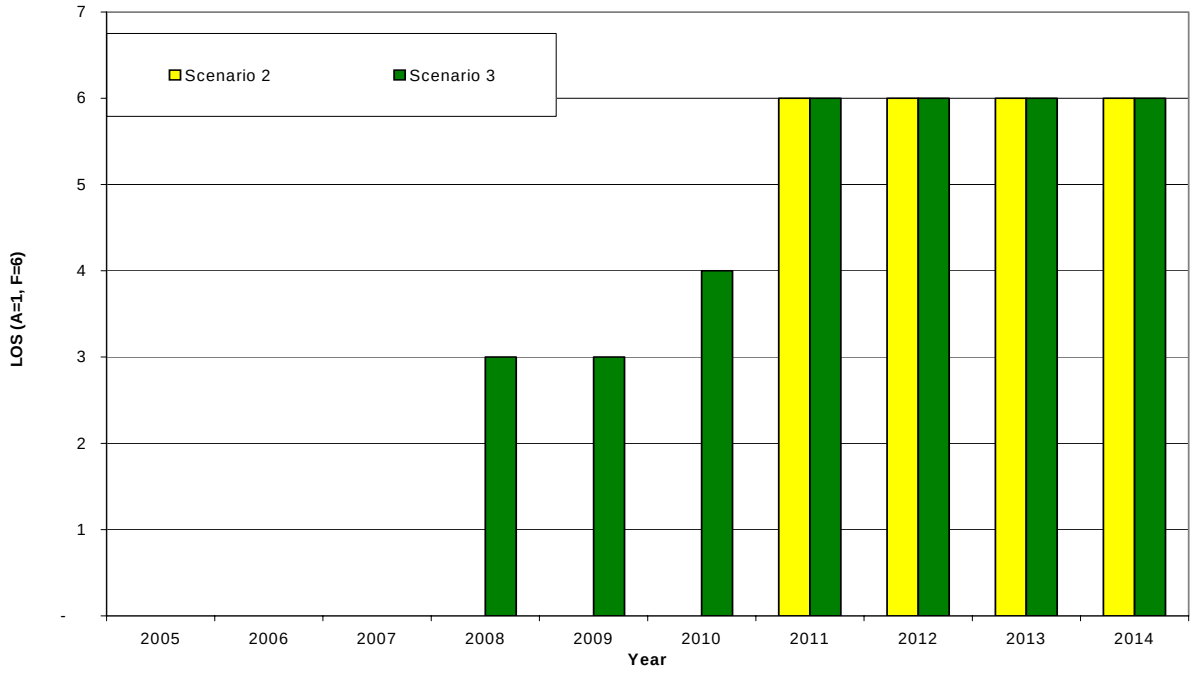
Figure 6-30 Scenarios 2 and 3
Transit Travel Time Per Person Per Year (in Hours)



Level of Service

One indicator of speed and travel time is the level of service. Level of service (LOS) is a well-known measure of roadway congestion. LOS A represents free flow conditions, while LOS F represents stop-and-go traffic nearing a system failure. Figure 6-31 shows the LOS on the Legacy Parkway.

Figure 6-31 Scenarios 2 and 3
Legacy Level of Service



Air Emissions

Figures 6-32 through 6-35 show the emissions for VOC's, CO, NOx, and PM-10, respectively. For comparative purposes, the emission factors used for this analysis were assumed constant from 2005 to 2014. Generally, these factors would be expected to decrease over time with improving technologies. NAAQS for regional conformity are met for both scenarios in the year 2020 based on recent conformity determination. These emissions are for the PM peak period and for emissions released from one of the components of the Shared Solution or emissions from vehicles diverted to arterial and connector thoroughfares in the North Corridor. An air emissions balance for the entire air shed over the study area is not calculated. All scenarios reflect likely conformity based on WFRCs current conformity analysis.

Figure 6-32 Scenarios 2 and 3
Peak Period Air Pollutants: VOC's

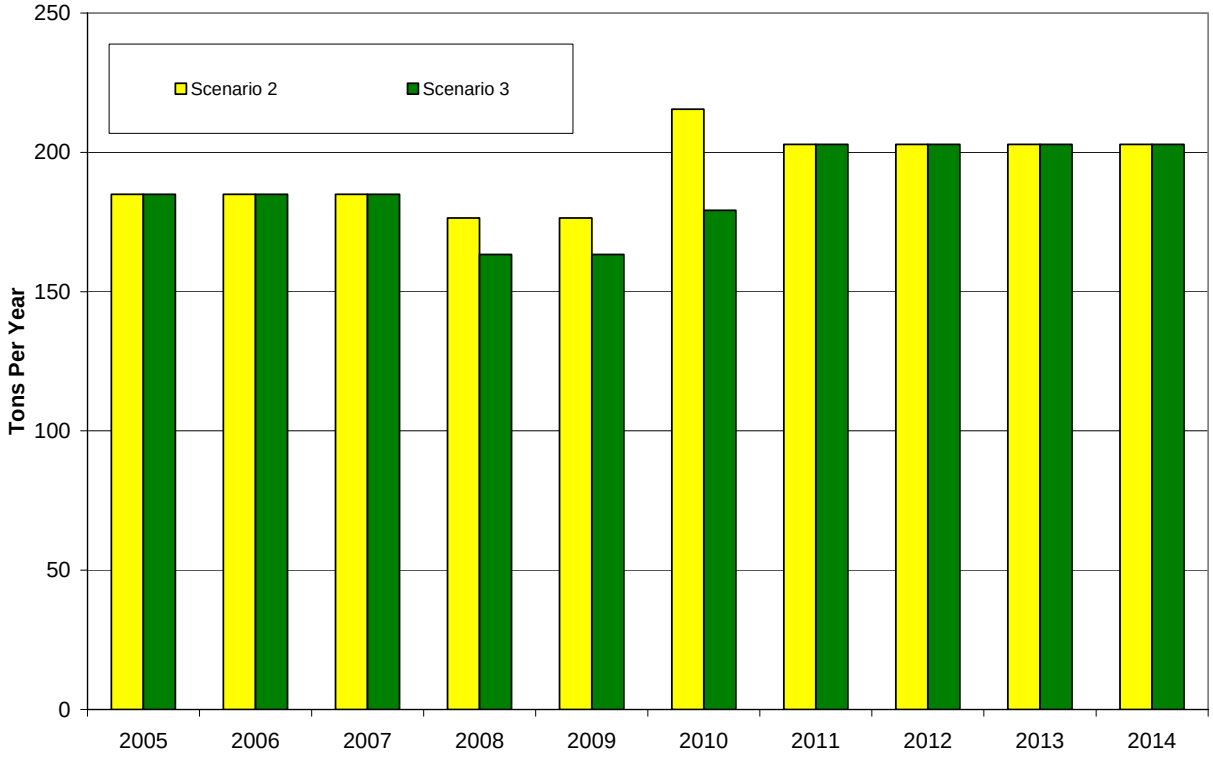
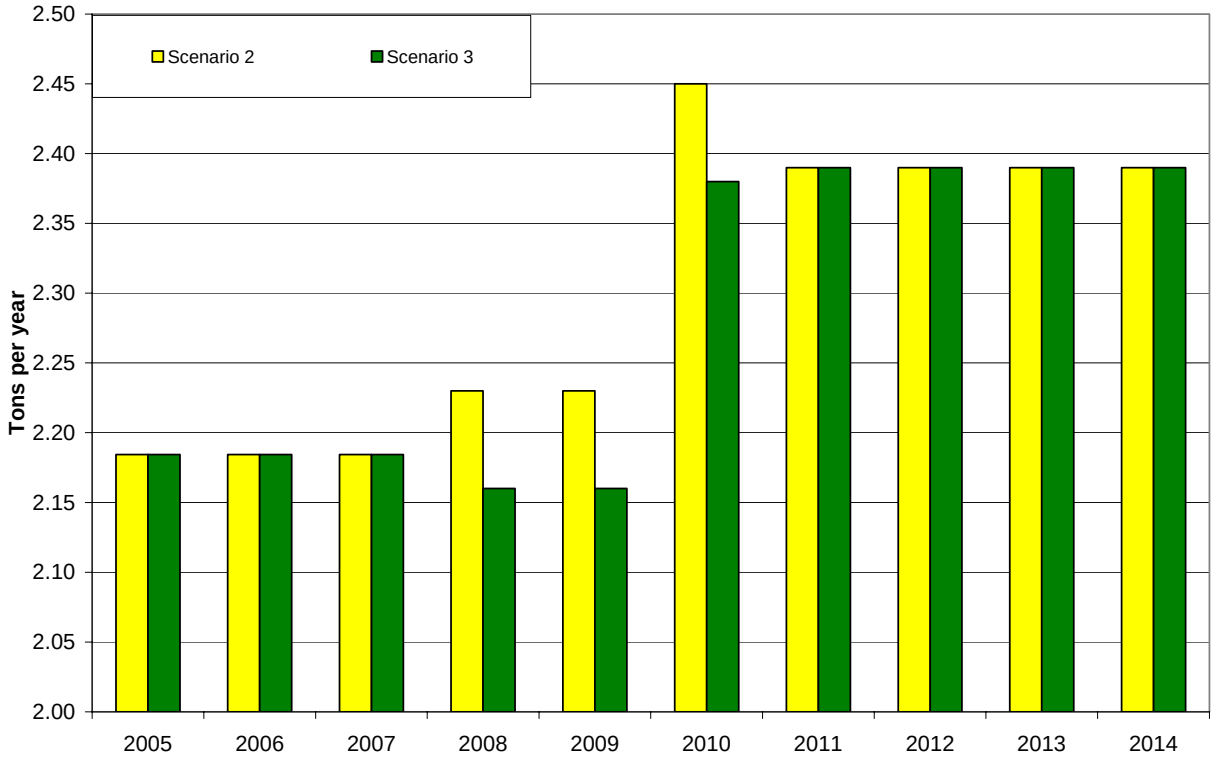


Figure 6-33 Scenarios 2 and 3
Peak Period Air Pollutants: CO

Figure 6-34 Scenarios 2 and 3
Peak Period Air Pollutants: NOx's

Figure 6-35 Scenarios 2 and 3
Peak Period Air Pollutants: PM-10's



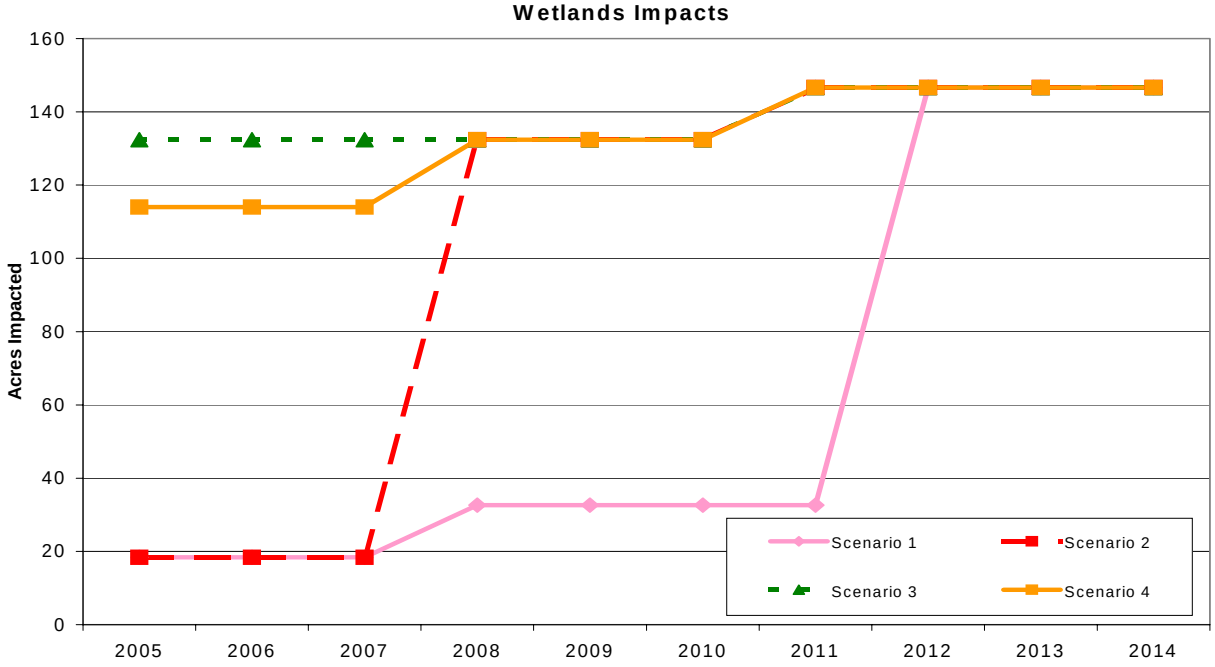
Comparison of All Scenarios

The following figures can be utilized to compare all scenarios. All figures are in sequential order with the text.

Wetlands

Wetland impacts for all scenarios are shown in Figure 6-36. Building the Legacy Parkway impacts 113 acres of wetlands, reconstruction of I-15 impacts 14 acres of wetlands, and building Maximum Transit impacts 22 acres of wetlands. Total cumulative wetland impacts will be the same for all scenarios.

Figure 6-36 All Scenarios
Wetlands Impacts



Costs to the Traveling Public

Costs to the traveling public are composed of the value of time spent in commute and the cost of energy, or, in the case of Robust Transit, a fare. Cumulative costs to the traveling public, annual costs to the traveling public, and individual annual costs to the traveling public for persons using I-15, Legacy, and commuting with Robust Transit are shown Figures 6-37 through 6-41 respectively. Costs are only for the PM peak period.

Figure 6-37 All Scenarios
Cumulative Costs to the Traveling Public

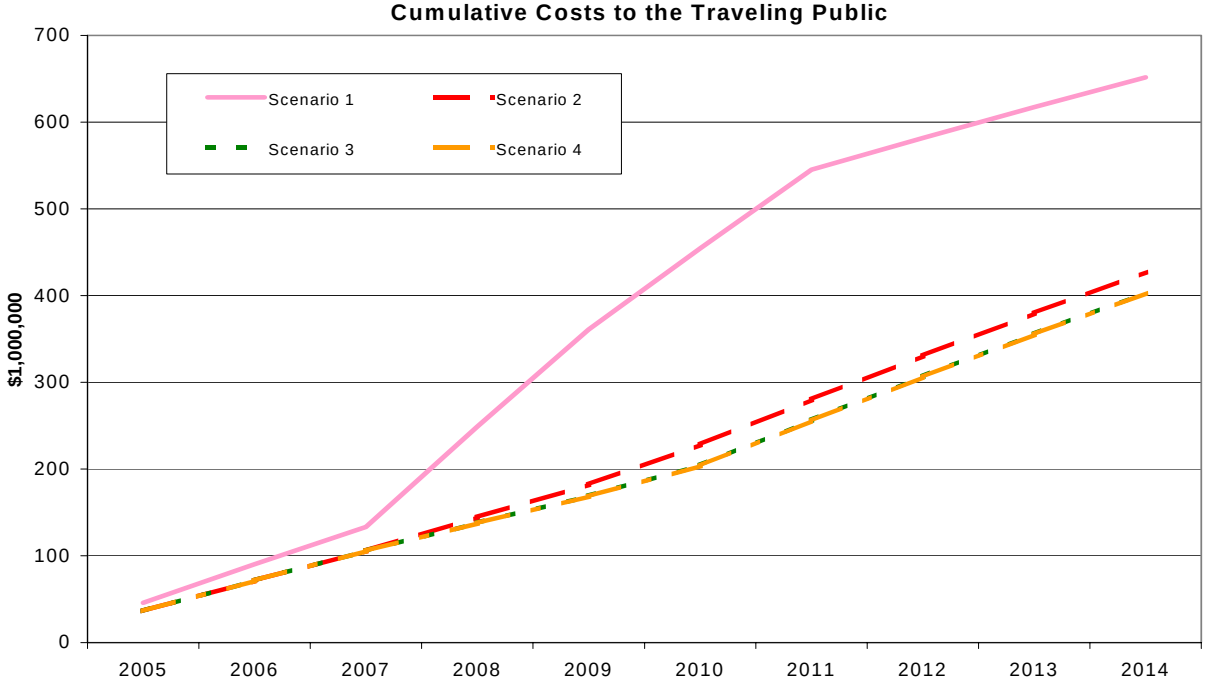


Table 6-38 All Scenarios
Annual Costs to the Traveling Public

Figure 6-39 All Scenarios
I-15 Total Cost Per Traveler Per Year

Figure 6-40 All Scenarios
Legacy Total Cost Per Traveler Per Year

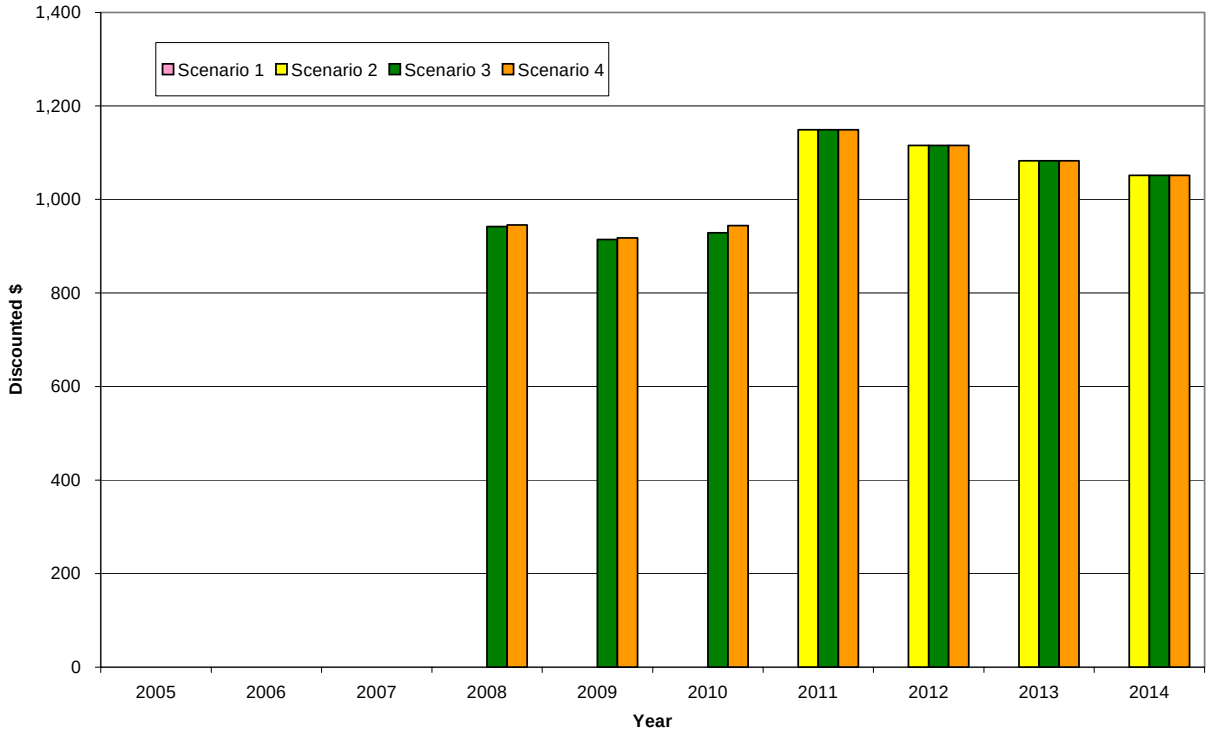


Figure 6-41 All Scenarios
Transit Total Cost Per Traveler Per Year

Average Speeds and Travel Times

Figures 6-42 and 6-43 show the annual average speeds and annual average travel times through the North Corridor on I-15, respectively. Figures 6-44 through 6-46 show annual individual travel times through the North Corridor for persons using I-15, the Legacy Parkway, and transit, respectively. These times are only for the PM peak period.

Figure 6-42 All Scenarios
Travel Speeds on I-15 Between US 89 and I-215 Interchange

Figure 6-43 All Scenarios
Average I-15 Travel Times Between US 89 and I-215 Interchange

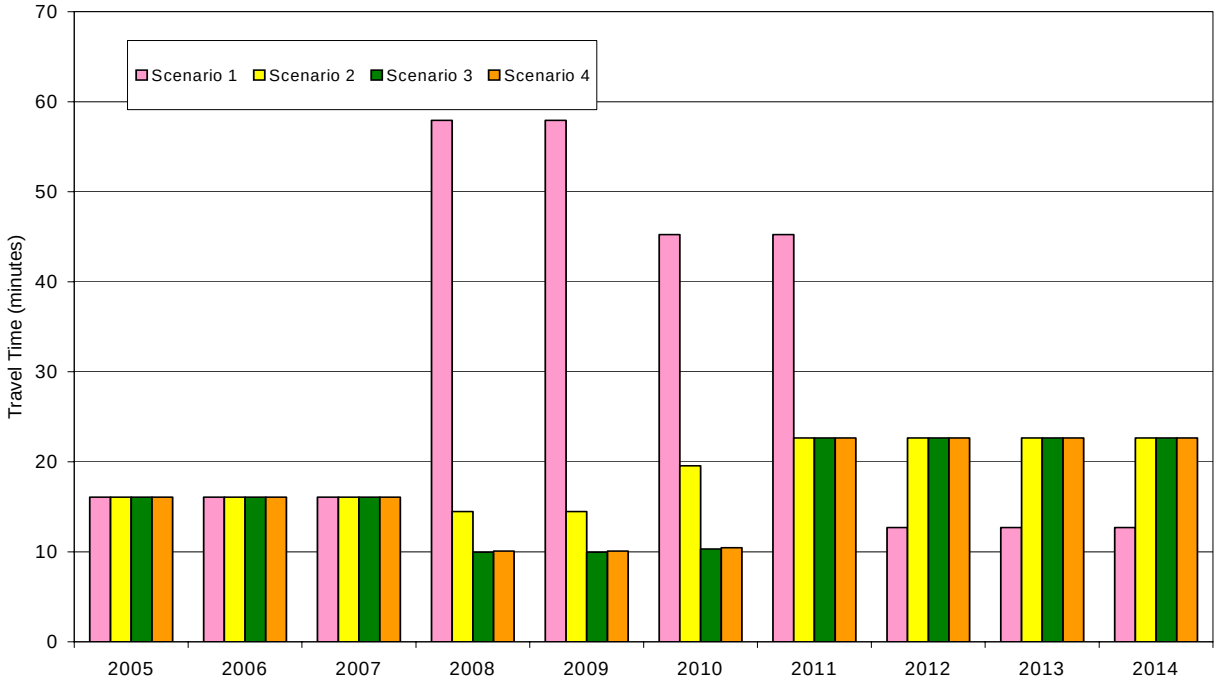


Figure 6-44 All Scenarios
I-15 Travel Time Per Individual Per Year (in Hours)

Figure 6-45 All Scenarios
Legacy Travel Time Per Person Per Year

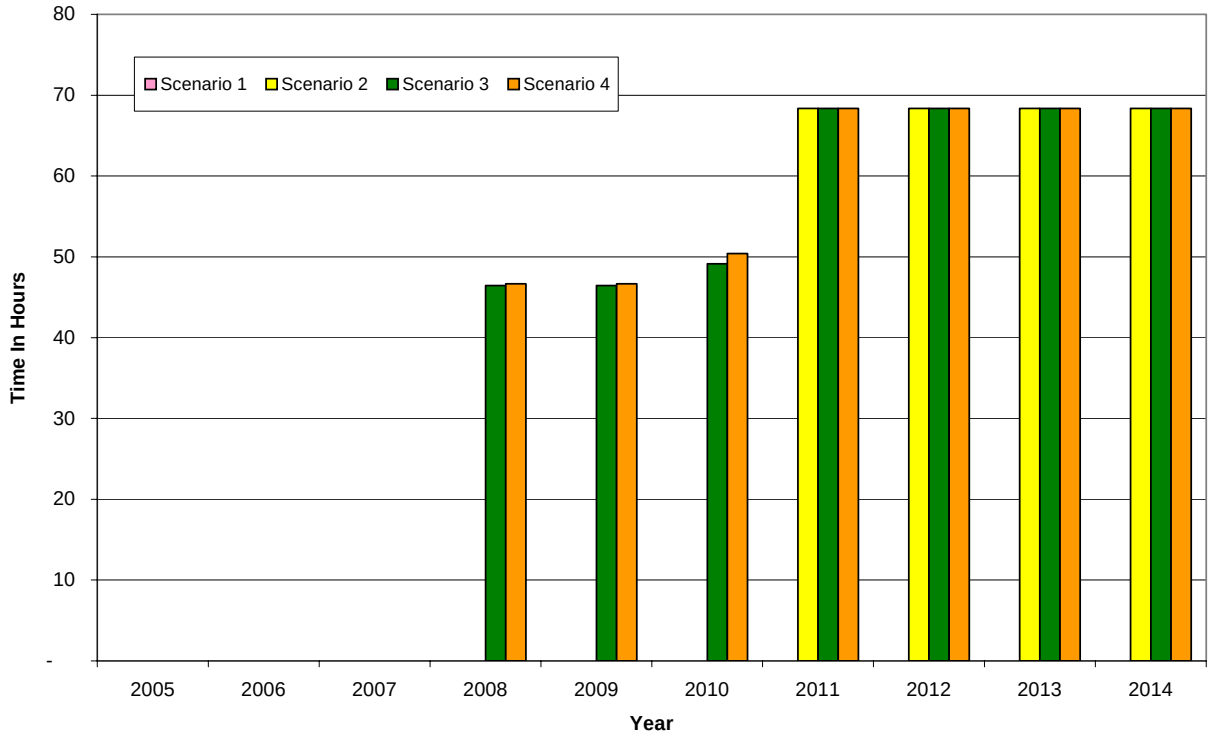


Figure 6-46 All Scenarios
Transit Travel Time Per Person Per Year (in Hours)

Level of Service

Figures 6-47 and 6-48 show the LOS on I-15 and the Legacy Parkway at the Woods Cross screenline in the PM peak period, respectively.

Figure 6-47 All Scenarios
I-15 Level of Service

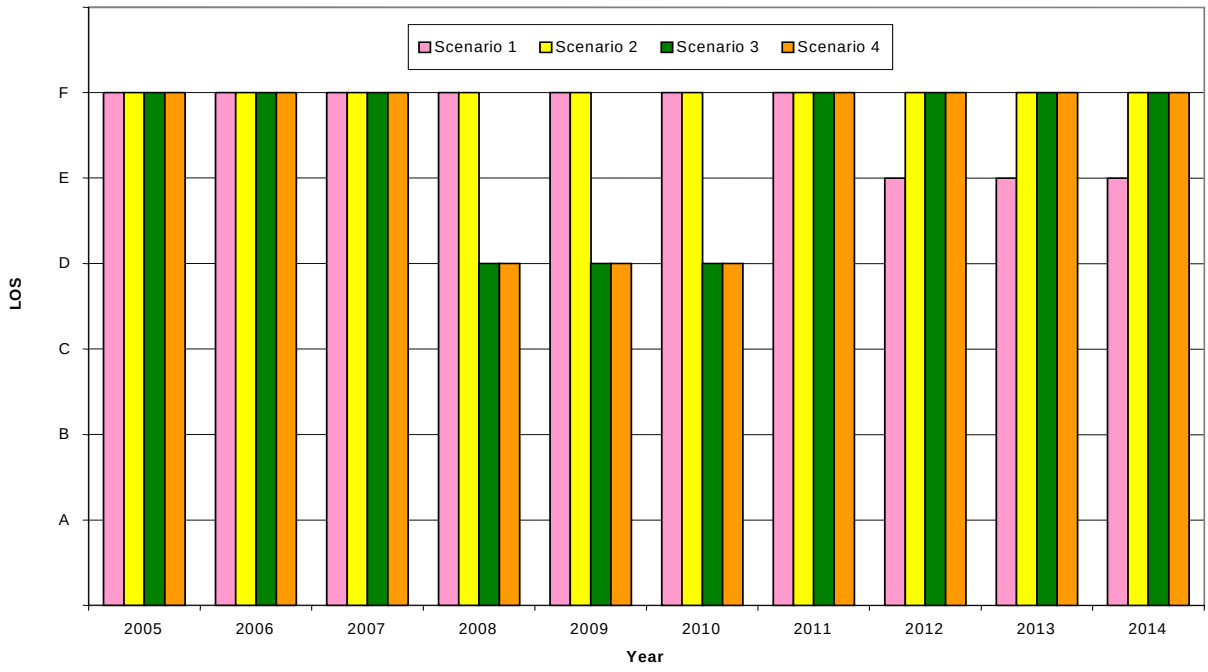
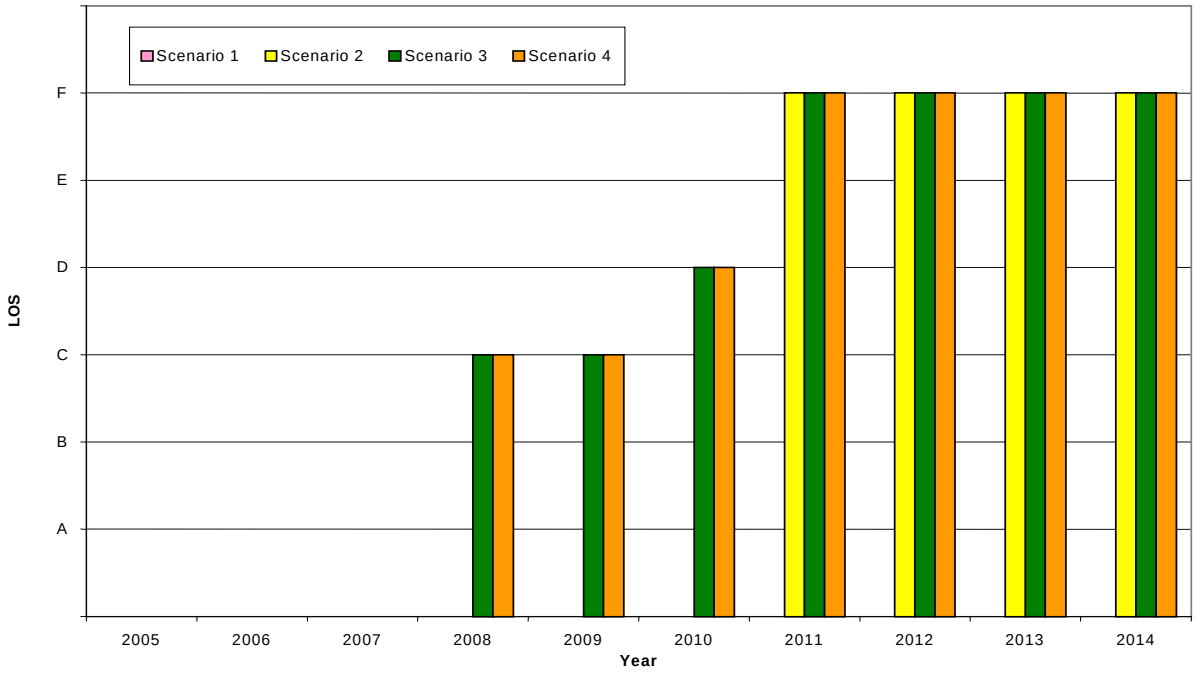


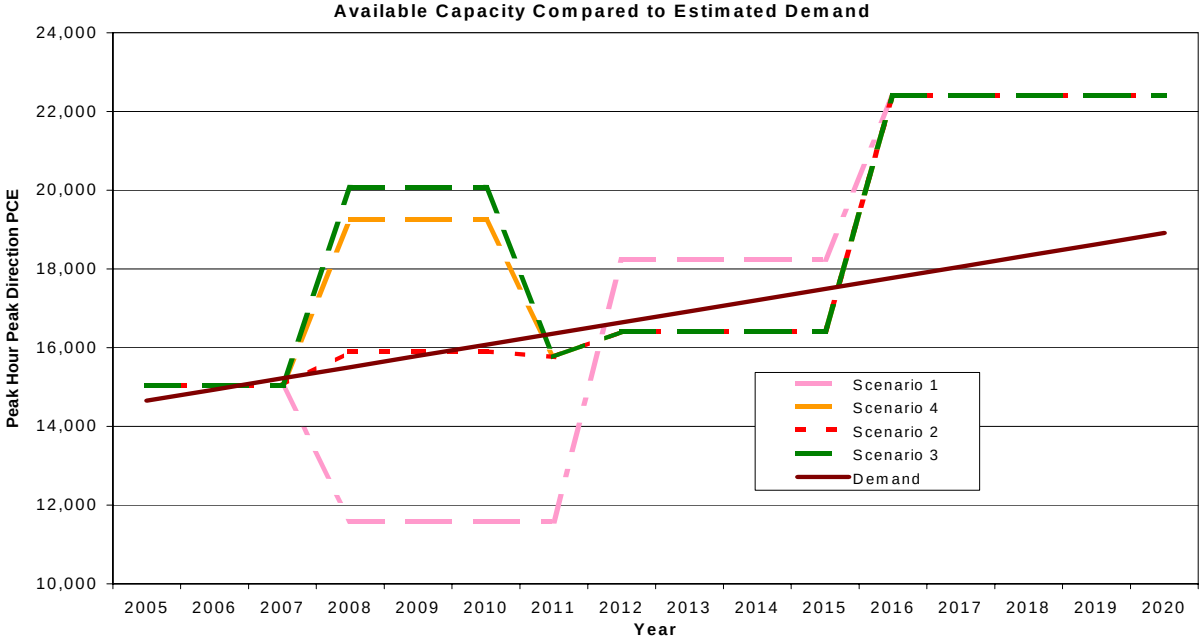
Figure 6-48 All Scenarios
Legacy Level of Service



Capacity vs. Demand

Figure 6-48 shows capacity versus demand for all scenarios. Demand through 2020 is based on WRFC traffic models for the shared solution. Transit capacity is assumed to be equal to demand. Capacity of I-15 during construction assumes 60 mile per hour free flow speed (65 mph is assumed for existing and future speeds).

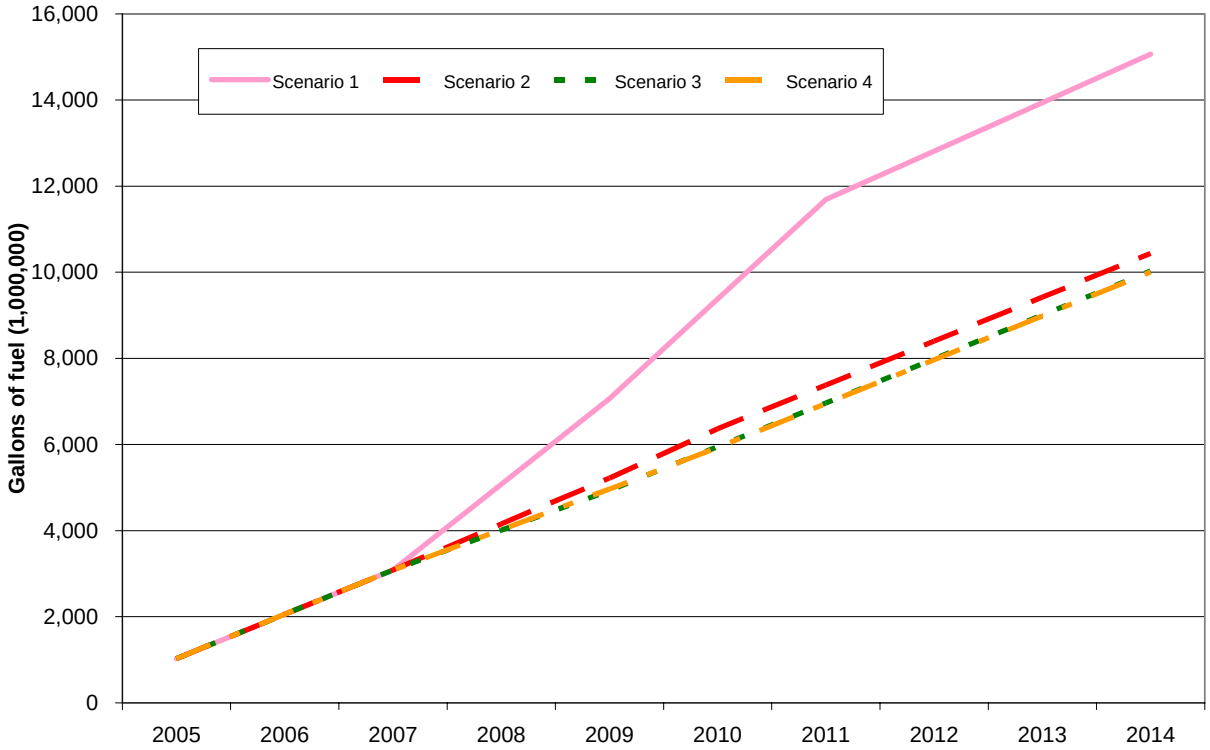
Figure 5-49 All Scenarios
Available Capacity Compared to Estimated Demand



Energy Usage

Energy usage is measured as the consumption of fossil fuels by autos, trucks, and transit vehicles. For this analysis, cumulative use of these finite resources is estimated through the period 2005 to 2014. Figure 6-50 shows the energy usage for all scenarios. Energy usage is only for the PM peak period.

Figure 6-50 All Scenarios
Cumulative Energy Usage



Air Emissions

Figures 6-51 through 6-55 show the total air emissions and VOC's, CO, NOx, and PM-10 emissions, respectively. For comparative purposes, the emission factors used for this analysis were assumed constant from 2005 to 2014. Generally, these factors would be expected to decrease over time with improving technologies. NAAQS for regional conformity are met for both scenarios in the year 2020 based on recent conformity determination. These emissions are for the PM peak period and for emissions released from one of the components of the Shared Solution or emissions from vehicles diverted to arterial and connector thoroughfares in the North Corridor. An air emissions balance for the entire air shed over the study area is not calculated. All scenarios reflect likely conformity based on WFRCs current conformity analysis.

Figure 6-51 All Scenarios
Total Air Emissions

Figure 6-52 All Scenarios
Peak Period Air Pollutants: VOC's

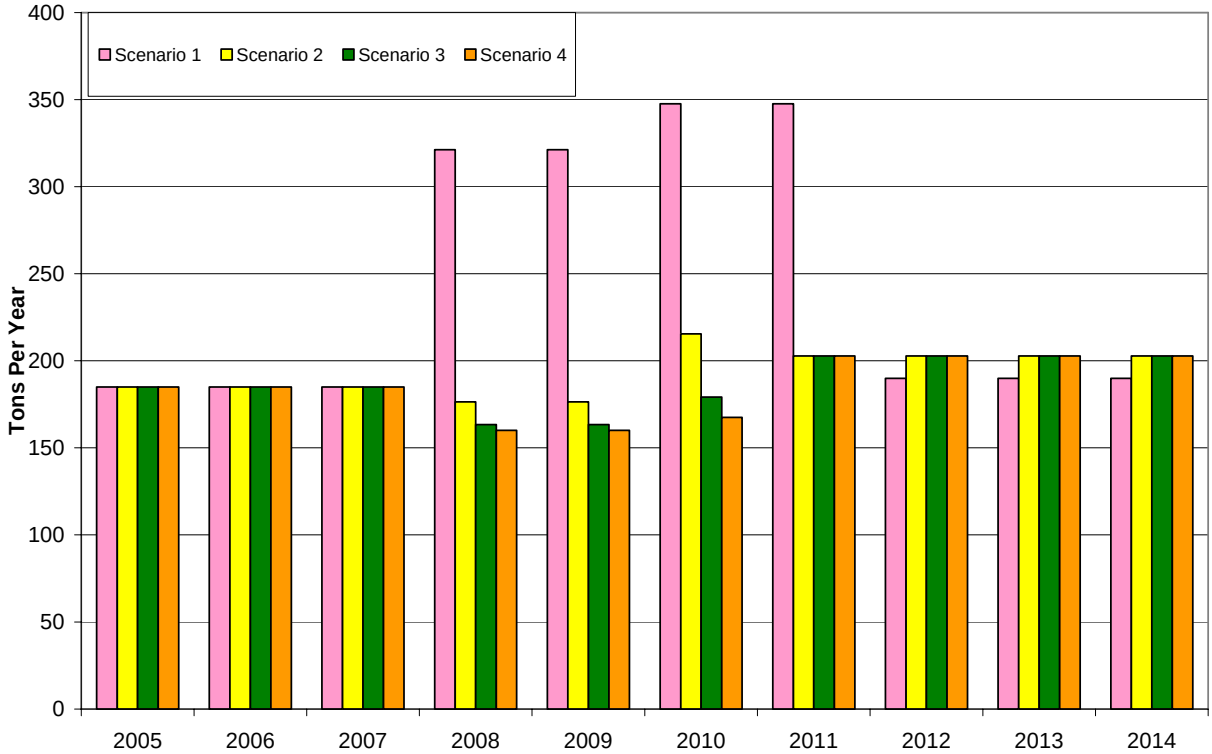


Figure 6-53 All Scenarios
Peak Period Air Pollutants: CO

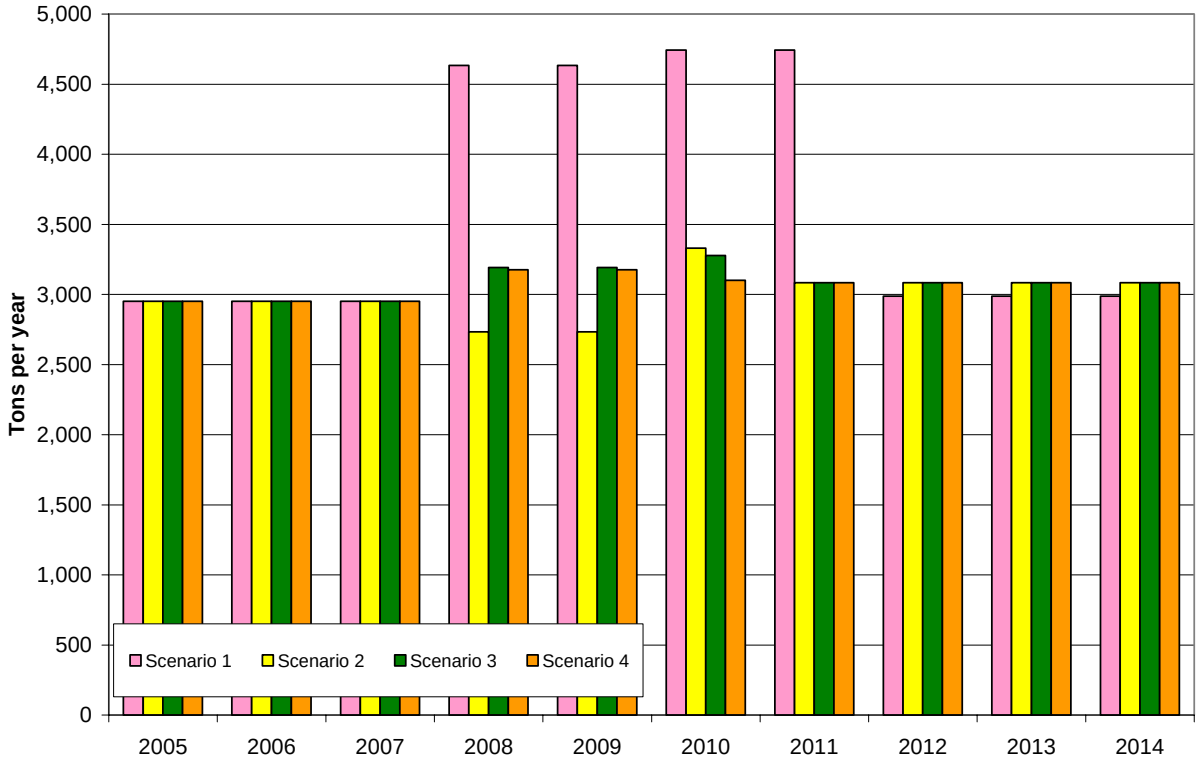


Figure 6-54 All Scenarios
Peak Period Air Pollutants: NOx's

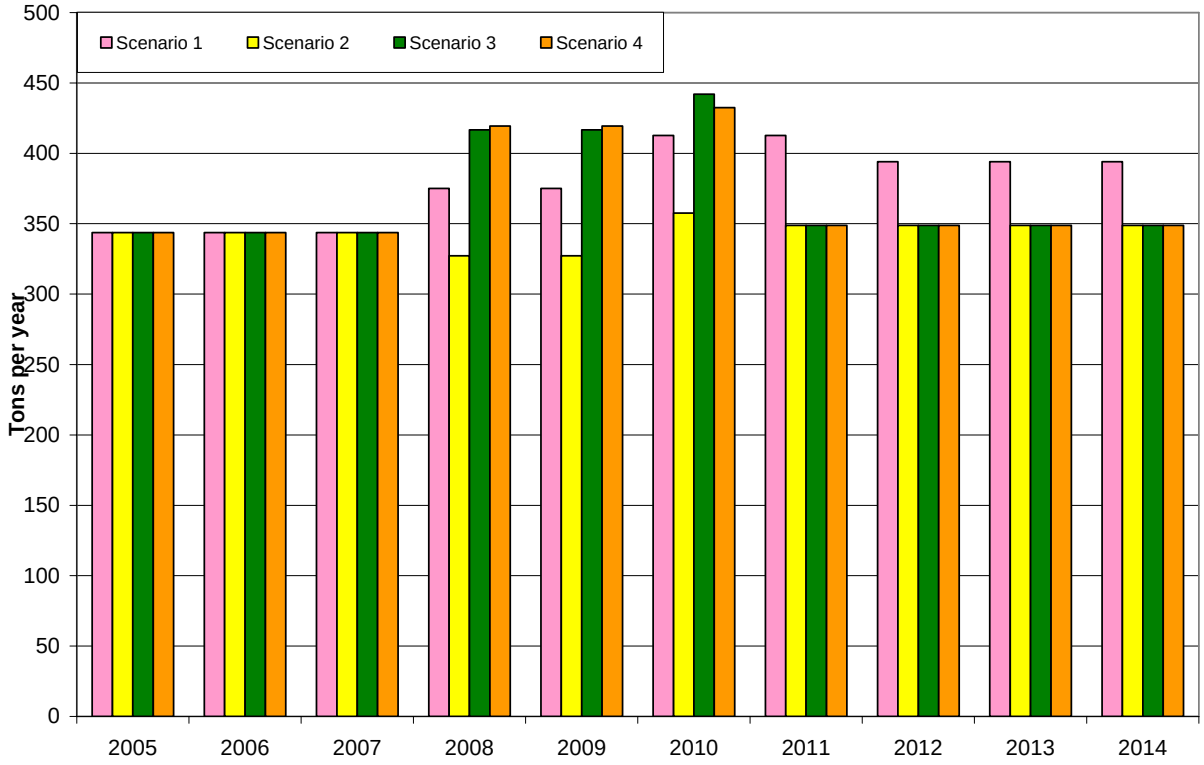
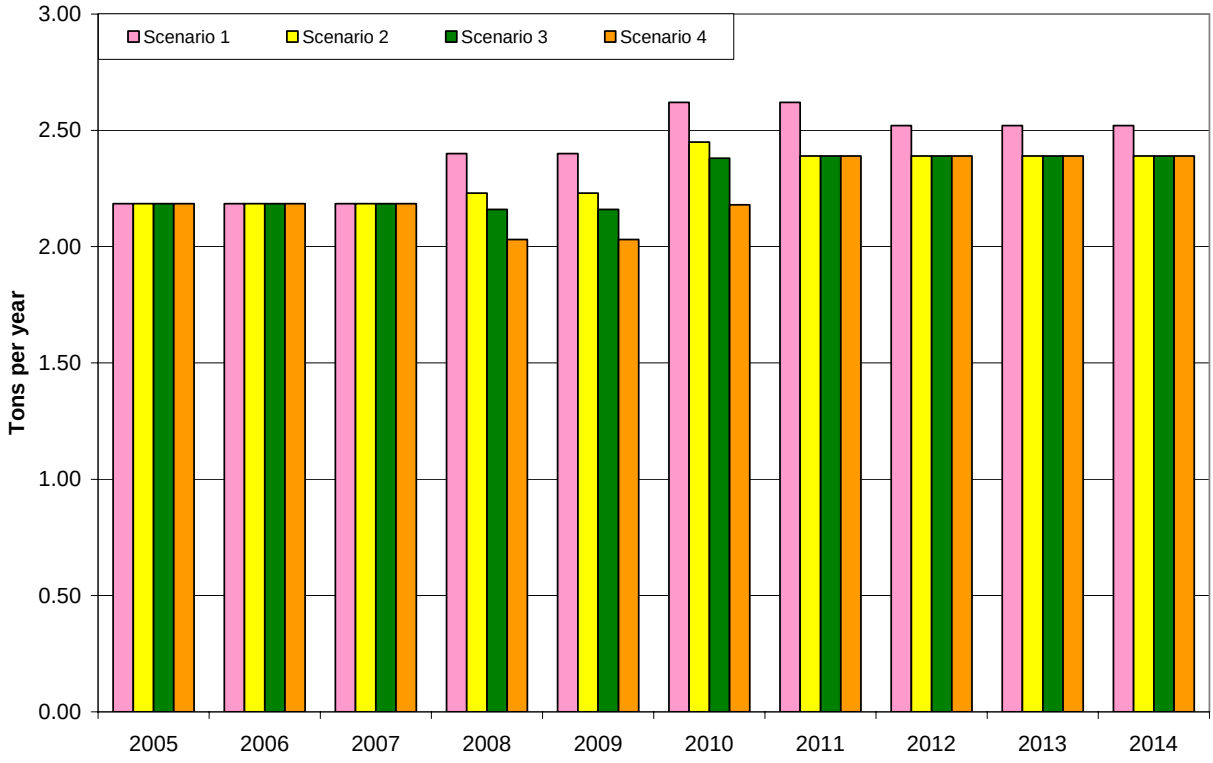


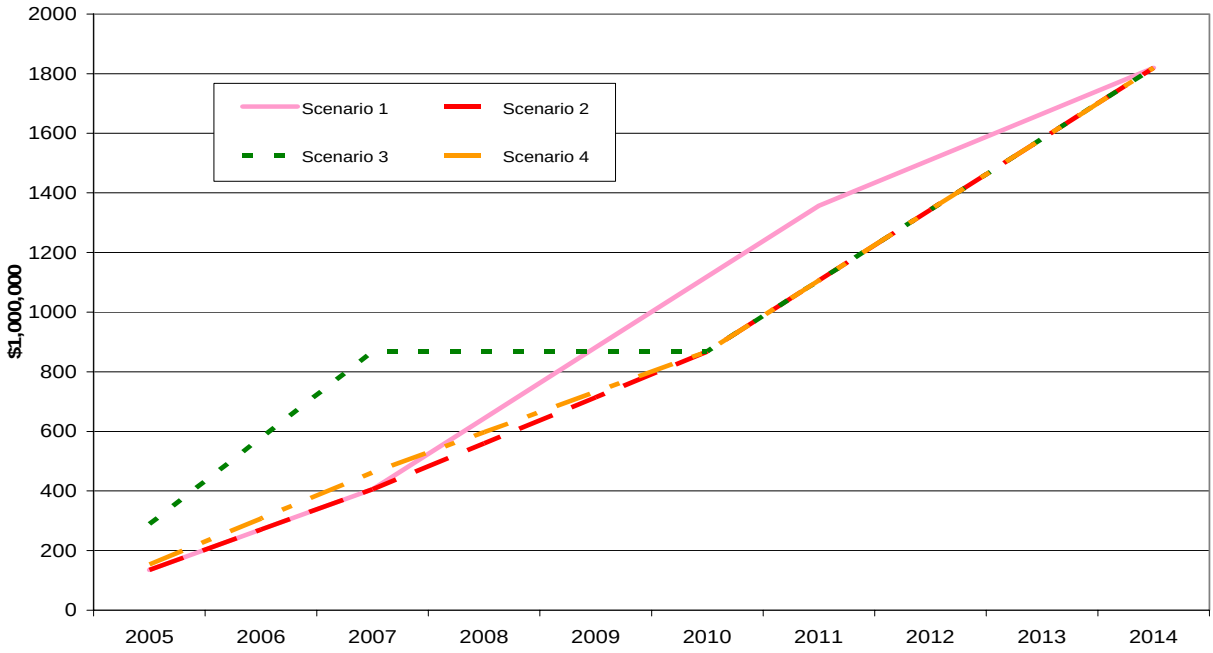
Figure 6-55 All Scenarios
Peak Period Air Pollutants: PM-10's



Construction Costs

Figure 6-56 shows the construction costs, in 2003 dollars, for all scenarios.

Figure 6-56 All Scenarios
Cumulative Construction Costs



Operating and Maintenance Costs

Figure 6-57 shows the operation and maintenance costs for all scenarios.

Figure 6-57 All Scenarios
Cummulative Operating & Maintenance Costs